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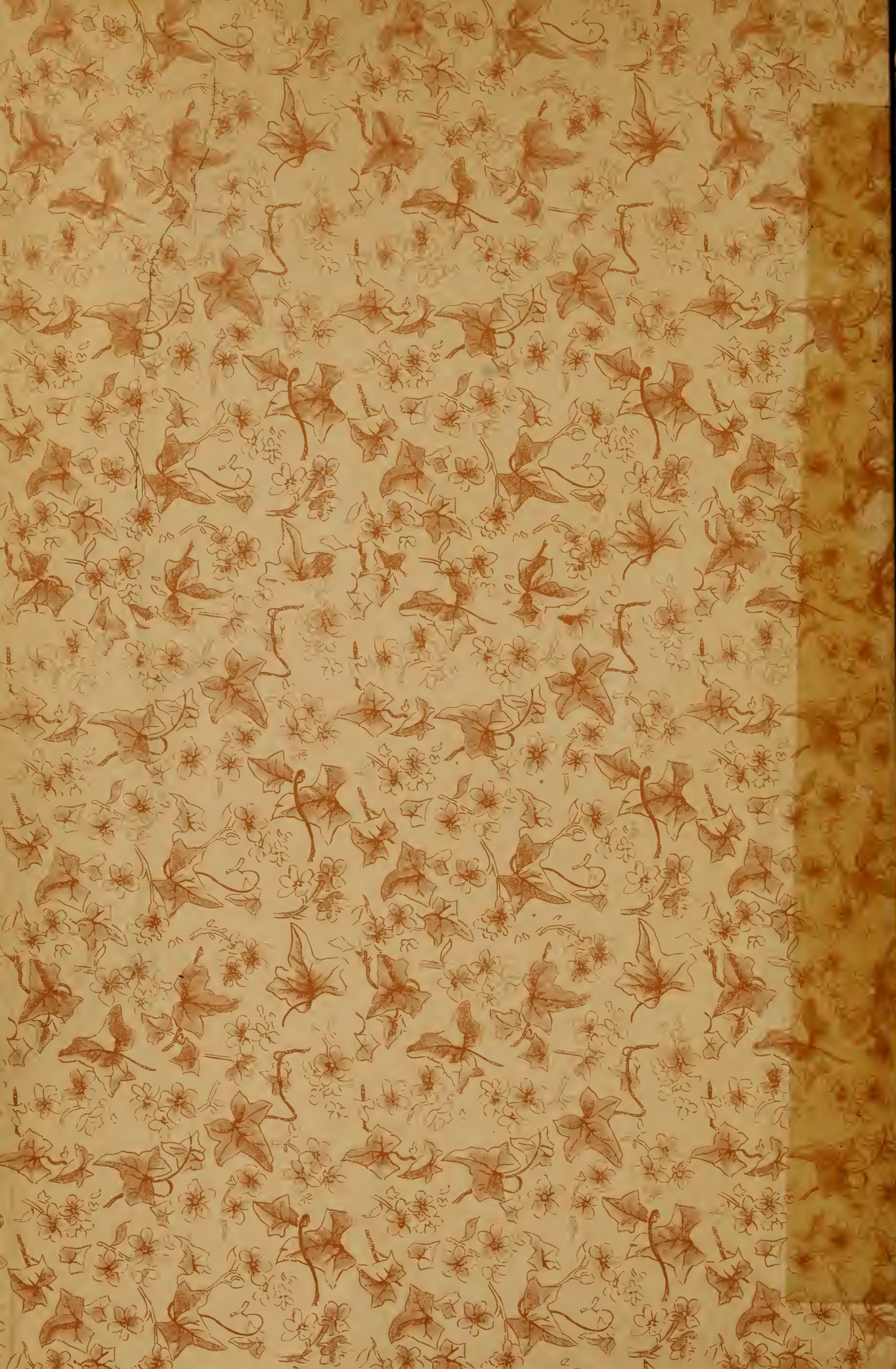

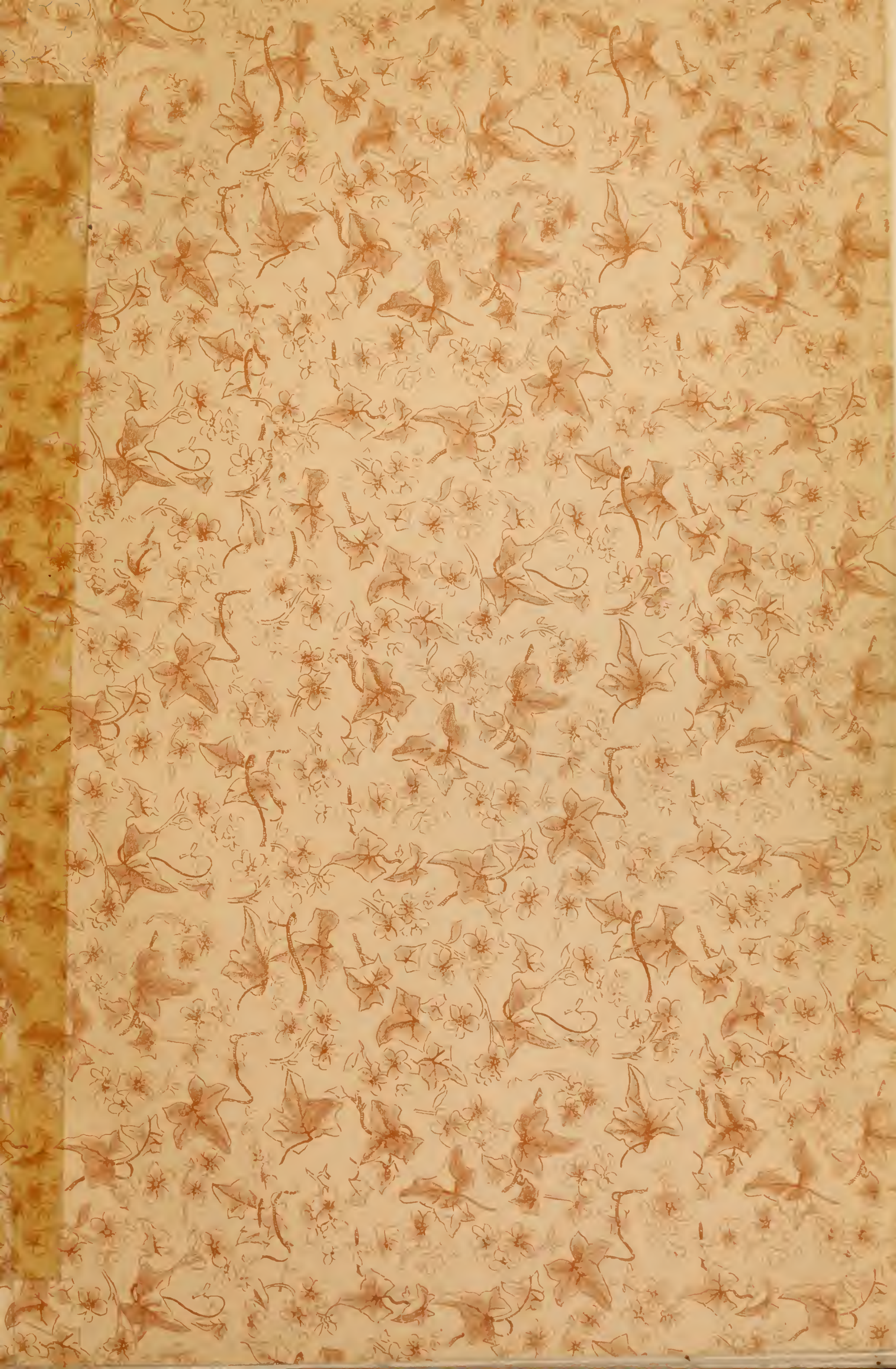

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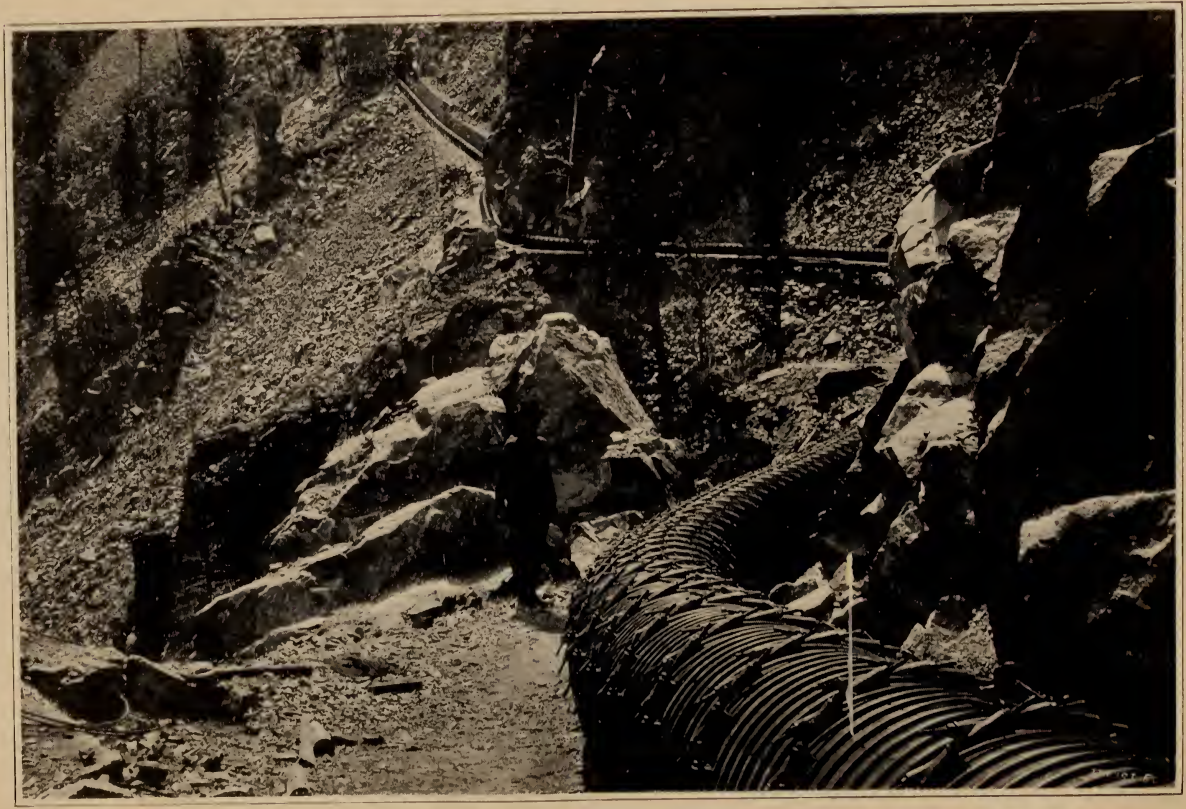
Denver, Colo.



PIPE LINE OF PIKE'S PEAK POWER CO., NEAR VICTOR.

COMPLIMENTS OF

ADDISON J. McCUNE,

STATE ENGINEER.

PIPE LI

TENTH BIENNIAL REPORT

OF THE

STATE ENGINEER

TO THE

GOVERNOR OF COLORADO

For the Years 1899 and 1900

DENVER, COLORADO
THE SMITH-BROOKS PRINTING CO., STATE PRINTERS
1901

LETTER OF TRANSMITTAL.

December 27, 1900.

To His Excellency,
CHARLES S. THOMAS,
Governor of Colorado.

Sir—In compliance with the provisions of law, I have the honor to transmit herewith the tenth biennial report of the transactions of the department of the State Engineer for the fiscal years ending November 30, 1900.

Very respectfully, your obedient servant,

ADDISON J. McCUNE,
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R. S. King, expenses, gauging	38 00
M. C. Hinderlider salary and expenses, gauging	95 65
R. F. Walters, salary and expenses, gauging ditches	180 00
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IN CHARGE OF IRRIGATION IN COLORADO.

ADDISON J. McCUNE, State Engineer	Denver, Colo.
ROD S. KING, Deputy State Engineer	Denver, Colo.

WATER SUPERINTENDENTS.

NAME	Division	Appointed	Residence
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E. R. Chew	No. 2	Mar. 29, 1899	Pueblo, Colo.
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H. C. Wheeler	No. 4	April 20, 1899	Durango, Colo.
A. F. Reeves	No. 5	April 20, 1899	Montrose, Colo.
C. S. Roberts	No. 6	Sept. 21, 1897	Hayden, Colo.

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CHAPTER I.

RECOMMENDATIONS.

The problems connected with the administration of irrigation laws of our state, as well as of the other arid states, together with the defects of our system, have been so often and so thoroughly discussed by former heads of this department, and by others who have made the subject a special study, that it seems superfluous to review them here, yet it is only by persistence that we accomplish a desired end.

It appears to us that the most serious question connected with irrigation is the unstable condition of our water rights. In many instances, as the communities depending upon irrigation grow older, complications seem to increase rather than decrease. Without stopping to discuss the causes of all the various complications, we desire to make some suggestions as to a remedy. In our own state the basic principle that all the water belongs to the state and can only be acquired by individuals or corporations through application to beneficial use and only so long as that beneficial use continues, is a good foundation upon which to build. But it appears we have drifted away from these principles by making it personal property to be peddled around to wherever it may be transferred. The temptation to speculate and the desire to do everything possible to encourage development has been a large factor in leading to this condition. Many of our troubles have arisen from carelessness in issuing decrees and by over-appropriations, the present method being a kind of grab game without the necessary public supervision. How can we get back to the original idea? Can we change or revise our laws so as to simplify them and not disturb vested rights nor destroy the individuality of the farmer? We believe there is a remedy for our troubles without much revision of the present laws, and that is in consolidation. Consolidation means co-operation. Are the farmers capable of organizing?

The farmer ordinarily is strictly an individualist. He wants to be where he can run his own affairs without the interference of any one. Many a farmer in settling in an arid region gave great preference to a location in some isolated spot on some small stream where he could, as he thought, have his independent ditch. Later on, as the country developed, he awakened to the fact that he was compelled to deal with his neighbor, or perhaps the whole community; that he had partners in the business up or down the stream.

But the farmers of the arid region are mostly educated. They soon learn to work collectively and to handle a corporation as successfully as the so-called "business" man. In fact, the farmer, no matter how small, under an irrigated system soon becomes a business man. Farming by irrigation, as has been said, is strictly a community affair. The very nature of things tends to cause co-operation. The farmer who lies awake nights to devise some scheme to get an undue advantage of his neighbor soon finds that the rule that gave him the advantage in one case turns out to be his destruction in another. We believe the much-discussed problem of public ownership can be successfully applied. The state should control the title to the water. The ownership of the canals and land should be with the water users. This is an instance where consolidation of interests can be made without the creation of a monopoly. Experience teaches that there is no danger of one individual, or a few individuals, getting control of any large system with the intention of keeping control of it. There may be exceptions, but this is the rule. The very best results under irrigation are obtained from the small farm that is owned by the man who lives on it and runs it. Many large co-operative canals are being successfully operated. In fact, most of the canals eventually become co-operative. The interests of all the water users under one drainage are almost as intimately connected as though they were under one canal. Why not consolidate them? It can be readily seen that if the land under a new drainage were to be reclaimed at one time by a system of canals and reservoirs, such a scheme could be carried out. If so, why not under an old one that is already partially developed? We are familiar with one case where a consolidation of four large ditches has been successfully consummated. At the time the consolidation was made it was argued by many that disagreements would arise which would result in destruction, and that the large owners of stock would soon absorb the small ones, and thus create a monopoly. Such has not been the case. The number of stockholders has increased (now over six hun-

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It appears to us that the most serious question connected with irrigation is the unstable condition of our water rights. In many instances, as the communities depending upon irrigation grow older, complications seem to increase rather than decrease. Without stopping to discuss the causes of all the various complications, we desire to make some suggestions as to a remedy. In our own state the basic principle that all the water belongs to the state and can only be acquired by individuals or corporations through application to beneficial use and only so long as that beneficial use continues, is a good foundation upon which to build. But it appears we have drifted away from these principles by making it personal property to be peddled around to wherever it may be transferred. The temptation to speculate and the desire to do everything possible to encourage development has been a large factor in leading to this condition. Many of our troubles have arisen from carelessness in issuing decrees and by over-appropriations, the present method being a kind of grab game without the necessary public supervision. How can we get back to the original idea? Can we change or revise our laws so as to simplify them and not disturb vested rights nor destroy the individuality of the farmer? We believe there is a remedy for our troubles without much revision of the present laws, and that is in consolidation. Consolidation means co-operation. Are the farmers capable of organizing?

The farmer ordinarily is strictly an individualist. He wants to be where he can run his own affairs without the interference of any one. Many a farmer in settling in an arid region gave great preference to a location in some isolated spot on some small stream where he could, as he thought, have his independent ditch. Later on, as the country developed, he awakened to the fact that he was compelled to deal with his neighbor, or perhaps the whole community; that he had partners in the business up or down the stream.

But the farmers of the arid region are mostly educated. They soon learn to work collectively and to handle a corporation as successfully as the so-called "business" man. In fact, the farmer, no matter how small, under an irrigated system soon becomes a business man. Farming by irrigation, as has been said, is strictly a community affair. The very nature of things tends to cause co-operation. The farmer who lies awake nights to devise some scheme to get an undue advantage of his neighbor soon finds that the rule that gave him the advantage in one case turns out to be his destruction in another. We believe the much-discussed problem of public ownership can be successfully applied. The state should control the title to the water. The ownership of the canals and land should be with the water users. This is an instance where consolidation of interests can be made without the creation of a monopoly. Experience teaches that there is no danger of one individual, or a few individuals, getting control of any large system with the intention of keeping control of it. There may be exceptions, but this is the rule. The very best results under irrigation are obtained from the small farm that is owned by the man who lives on it and runs it. Many large co-operative canals are being successfully operated. In fact, most of the canals eventually become co-operative. The interests of all the water users under one drainage are almost as intimately connected as though they were under one canal. Why not consolidate them? It can be readily seen that if the land under a new drainage were to be reclaimed at one time by a system of canals and reservoirs, such a scheme could be carried out. If so, why not under an old one that is already partially developed? We are familiar with one case where a consolidation of four large ditches has been successfully consummated. At the time the consolidation was made it was argued by many that disagreements would arise which would result in destruction, and that the large owners of stock would soon absorb the small ones, and thus create a monopoly. Such has not been the case. The number of stockholders has increased (now over six hundred), instead of decreased, the physical condition of the system has been improved and better service given than before. If a consolidation of four canals can be successfully made, why not thirty or forty, if the benefits are proportional? Such consolidation would result in an enormous saving of expense in maintenance and a very considerable saving of expense in superintendence. It would also result in a great economy in the use of water. It has so often been recommended that police control of commissioners be extended to ditches. Under this plan the commissioners could be made superintendents of the ditches. Already a tendency in the direction of such consolidation is seen in the organization of all the farmers on certain streams for the purpose of constructing reservoirs. It is discovered that the construction of a system of reservoirs upon the headwaters of any mountain stream is very beneficial to the whole valley, but not profitable for individual enterprise. This fact has led to co-operation. If the general government will undertake the construction of reservoirs the question will be simplified. A move has already been made in the Arkansas valley in the direction of co-operation. An organization of all the principal canals east of the canon at Canon City has been effected for the purpose of studying methods which will be of mutual benefit, and for the purpose of checking litigation.

Ditch systems are worthless without customers for the water and the land under them. In some parts of the state our most crying need is not so much more capital for new schemes, but more farmers with capital and muscle to develop land already under ditch. Many farmers are scared away from our state by litigation, or the fear of it. The consolidation of all the interests under one system ought practically to do away with litigation. We do not believe such consolidation can be brought about without some form of legislation. We are of the opinion that some form of district irrigation law patterned after that of Nebraska and modified to suit the conditions in our state, might be applied to this purpose. To frame a law that will provide for the consolidation of all the ditches of one drainage system as near as conditions will allow, and at the same time not stultify individual effort in the direction of the economical use of water, and in other ways, will require the most careful study.

CONCERNING WATER COMMISSIONERS AND THEIR DUTIES.

The different state engineers, ever since the establishing of this department, have been making recommendations for improving the law governing water commissioners and superintendents, yet very little advancement has been made.

The observations of Mr. Maxwell, in the sixth biennial report, covers the ground so well that it is needless to take space in this report for any further lengthy discussion of it.

The lack of systematic legislation on the subject is due, perhaps, to the primitive condition of the irrigation interests in a large part of the state and a laudable desire to keep down expenses. The offices of water commissioner and superintendent of irrigation are usually looked upon as sinecures, and that bills for such service should be kept down to the lowest possible notch. Much can be done by the officers themselves to overcome the prejudice against them by being discreet, faithful, and as moderate in their charges as is consistent with the duties performed. As the state grows older the people will be willing, we think, to pass the necessary legislation. Most people admit the necessity of such officers. Why not, then, make such regulations as will increase their efficiency? The older sections of the state are now paying in some instances respectable salaries and should expect good services in return.

In this connection we recommend that all water commissioners be required to keep a careful record of their work for each season, with a complete history of each ditch and reservoir in tabulated form, together with such notes and observations as may be of value in succeeding years. This record should be kept in a book furnished by the state and to be turned over to the successors, together with all orders and letters of the superintendents. An effort was made by this office in the beginning of the present year to have such a book prepared, but it was found that there were no available funds to publish it, and the matter was dropped. Mr. A. F. Reeves, superintendent of division No. 5, had printed a book for use in his division covering practically the ideas expressed above.

SUPERVISION OF RESERVOIRS AND RESERVOIR CONSTRUCTION.

An act of the Twelfth General Assembly in relation to reservoirs provides that no reservoirs with dams above ten feet in height and covering an area of more than twenty acres shall be constructed except upon plans and specifications approved by the State Engineer. He shall also be the consulting engineer during construction. The same act provides that the State Engineer shall annually inspect all reservoirs within the state and determine to what height they may be filled.

While it is very proper to have state supervision of this work, it is hoped that this office will not be criticised for failing to execute the law in its present shape. If it were complied with two or three representatives of this office would have to be in the field the entire season on this work alone. This work had to go undone except as the State Engineer or his deputy could catch a day or so from more pressing duties, and only those that were convenient of access were visited except where demands were made by interested parties. Special effort, however, was made to give attention to the supervision of work upon a few of the more important dams now under construction.

The work of examining and approving the plans has been anything but satisfactory, as it has had to be done in every case too hurriedly, and in most cases without sufficient knowledge of conditions to be able to pass intelligently upon them. Plans for a great variety of types of dams have been presented, many of which were very incomplete and in crude form. Some general instructions should be issued from this office as to specifications and information required concerning the site, etc.

With the bulk of the internal improvements out of the way, more attention can be paid to this work in the future.

FOREST PRESERVATION.

While we do not think the preservation of our forests is vital to the conservation of the water supply, yet it is of enough importance to merit much more attention than it is likely to get, and is so intimately connected with irrigation that remarks upon the subject in a report from this department need no apology. The principal part of our forest area is public land and will perhaps always remain so. The preservation of the timber then should mainly be in the hands of the general government, as it is an undertaking of vast magnitude. How to frame laws that will preserve it and at the same time not retard the development of farms and acquire the opposition of settlers is a question that is worthy of study. A public sentiment in favor of forest protection will do as much good as any laws. The most serious enemy, of course, is fire. The present police supervision of the general government, it is hoped, will avail something, but it has failed in many respects. It seems impossible to do much without an army of range riders. They should be on duty during the whole of the summer season, regardless of whether there are fires or not. The present method of having riders called out after fires start, encourages dishonesty. While, as was said before, the work should largely be done by the general government, there is no reason why the state and counties should not co-operate. The state and general government are co-operating successfully so far as it extends in the hydrographic work, and why not in the work of preserving the forests?

APPROPRIATIONS FOR POWER AND MANUFACTURING PURPOSES.

The statutory proceedings for determining the priority of rights apply to the appropriation of water for irrigation alone, we believe, and cannot be used for the purpose of determining the claims of parties to the use of water for other purposes. So many appropriations are being made for power and domestic purposes it is evident that many conflicts will occur with appropriators for irrigation. Already there have been many conflicts between the two that have given the administration much annoyance. It would seem wise to provide for adjudication of all rights so that the proper officers may have some legal record upon which to act in the distribution. This office is frequently asked as to the filing of claims for purposes other than for irrigation. In all such cases we have advised the filing of statements and plats under the regulation governing filing for irrigation purposes. Such filings, if not provided by statute, will be of value as evidence when proof is made.

ADJUDICATION OF RIGHTS.

The above remarks lead to the suggestion to water users, especially in the newer portions of the state, to look well to the title to their water rights. Much carelessness is manifested in this direction, especially in the mountain districts, where the water supply is considered abundant. We wish to warn those who feel so secure in their title to water that the time is not far distant when every drop of water will be appropriated and put to use. Many delay an adjudication on account of the expense. If it were to perfect title to their lands no such excuse would present itself. To quote from the report of Superintendent Armstrong: "The longer the sitting of a referees' court is delayed the more expensive it will be and the more difficult it will become to procure testimony to prove priorities."

TRANSFER OF WATER RIGHTS.

The recent law requiring parties desiring to change the point of diversion to apply to the courts for a decree of transfer, has been of considerable benefit since it has had a tendency to check the barter and sale of water and the peddling of it around the country as so much merchandise. No one will incur the expense of procuring a decree of transfer under the new law unless he has a good case to begin with. Concerning the question of temporary transfer, or loan and exchange of water, we do not feel like expressing an opinion. No appeals from the action of the district and division officers concerning it have reached this office. If carried to the extent it may be under the interpretation of some, it would virtually be the setting aside of decrees. All recognize the benefits from rotation or the alternating of the water in the different ditches, and under proper restrictions much good should come from it. We would respectfully call attention to the remarks of the several superintendents of irrigation upon this subject.

STREAM GAUGING.

Requests are constantly being made upon this office for information concerning the flow of mountain streams. This information is desired by parties having in view the construction of power plants. The application of electricity to the transmission of power makes it possible in time to utilize every stream of the state for power purposes, no matter how isolated it may be from the populous districts. No public improvement would be of more general benefit than an expenditure of about $5,000 per year for a term of five years in making stream measurements. Private parties will do but little in this direction for the reason that a few random measurements are not of sufficient value upon which to base the expenditure of a large sum of money. The observations should extend through a term of years. The sum named, together with the usual appropriation, would enable this office, in co-operation with the United States hydrographic department, to obtain information that would serve as a foundation upon which many power plants, as well as irrigation enterprises, could be planned. The sum named would enable this department to put a force in the field that could cover the whole state and at the same time do much in the way of ditch gaging and inspection of reservoirs. This sum, together with the usual appropriation, would be less than that of the mining bureau. The irrigation interests alone are keeping pace with that of mining and are deserving of like attention. But this money would not be spent entirely in the interests of irrigation. The water power development and the conservation of water for domestic use for the mountain towns will be of great aid in the development of the mining industry. We would call particular attention to the remarks of Mr. Fellows upon this subject in his chapter upon stream gaging.

STATE ENGINEER'S LIBRARY.

This office has some hundred or more volumes pertaining to irrigation and hydraulics, government reports, etc., together with numerous bulletins and pamphlets on irrigation and kindred subjects, which is quite a nucleus for a good library. There is a large amount of very valuable information in these books and pamphlets, and especially in the government reports. Much of this, however, is valuless to the general public and even to the office in its present condition. Some of it is stored away in the vault for want of shelves outside on which to put it. These books should be carefully catalogued in proper library indices. There are many articles in these books of the greatest importance upon Colorado and Colorado resources, as well as upon irrigation laws, which are not generally known and cannot be referred to offhand without an alphabetical catalogue or some similar means. The bulletins and pamphlets should be bound and properly labeled. The State Engineer should be authorized to spend a small sum each year in procuring standard works on irrigation, road building, reports of other state engineers, reports of the geological survey, department of agriculture, such trades publications as would be appropriate and desirable, and other standard reference works in matters pertaining to the work of this office. Most of the reports can be obtained free or by exchange for the reports of this department.

AGRICULTURAL DEVELOPMENT.

While the development of our agricultural resources has not been what it should be, considering the many advantages to be had here, yet the growth has been steady and permanent. Although the reports of acreage under cultivation are incomplete, yet they show an increase over any previous year in every division. But few large ditch enterprises are under way; however, the development under those already built has gone steadily forward, and in the mountain country especially, the winter feeding of stock which has come into vogue so generally within the last few years, has stimulated the opening up of many farms on ground that would otherwise continue desert or grazing lands.

In the Platte river division one enterprise of considerable magnitude is nearing completion. The very considerable and steady increase of the water supply of this division, due to the return waters, gives an opportunity for a very large increase in the irrigable area of that section.

In the Arkansas valley there has been considerable increase of acreage. There is already ditch capacity to utilize the most of the direct flow of the streams. But with the aid of the many available storage reservoirs the improvement of the ditch systems already in existence, together with a more careful distribution of the supply, we may expect a large increase in the cultivated area in that valley. The advent of the beet sugar industry into the valley will be an important factor in its growth. In some respects this is the most important system in the state. It is one of the most difficult to handle and one deserving of considerable study.

In division No. 3, the Rio Grande river division, the area under ditch cannot be materially increased without the aid of storage reservoirs. The international complications that have arisen on the lower Rio Grande caused the government to instruct the interior department to refuse all reservoir filings on that drainage basin. This order stopped all efforts in that direction. It is thought that this restriction will soon be removed, when much reservoir construction will go on in that division. Notwithstanding the scarcity of water, the acreage under cultivation has increased since last report. In division No. 4 (San Juan river) the throwing open of the Ute Indian reservation gave considerable impetus to settlement and several ditch enterprises of considerable importance are under way. In division No. 5 (Grand river), and No. 6 (White river), although containing the greatest abundance of water, no large enterprises have been undertaken. However, several ditch and reservoir schemes of considerable importance are under way. But the principal development in these two divisions consists in the opening up of farms on the small streams and the construction of numerous small reservoirs high up in the mountains. This growth has come largely through the stimulus derived from stock feeding. No single industry has done so much perhaps to develop the irrigation interests of the state as the change from the old exclusive range system to that of winter feeding.

GOVERNMENT AID.

While our agricultural resources are capable of being increased five fold, yet it is well known that henceforth the development must proceed exceedingly slow if we must depend upon private capital, for reasons that it is not necessary to discuss in this report. For years those who have had this subject most at heart have felt that it is a work that is entirely within the province of the general government to aid. Just recently the agitation in this direction is so strong that there is some hopes of accomplishing something in the near future. Our state, than which none should be more interested, has been accused of apathy upon the subject. We earnestly recommend that the legislature memoralize the congress of the United States to undertake the construction of some of the most important of these irrigation works necessary to reclaim our arid lands.

CHAPTER II.

INTERNAL IMPROVEMENTS.

The Twelfth General Assembly was flooded with bills calling for appropriations out of the internal improvement fund for all parts of the state, which aggregated two or three times the amount available. In order to keep within the limit of funds available it became necessary, therefore, to make a general reduction in the amounts demanded; and in order to do this, and at the same time give each and every district a share of the fund, a reduction was necessary of the amount of each appropriation, instead of reducing the number of appropriations. It is hardly proper to criticise the actions of the legislature in this matter, for this fund is properly regarded as belonging to the entire state, and each district is entitled to such proportion as may be obtainable for the needs of that district. Yet, instead of touching a spot here and there over the state, it would seem wise to plan comprehensive systems of roads in the parts of the state most needing aid, and make appropriations from time to time, as the money became available, for the improvement of certain portions of each system. The improvements thus made would be of much more substantial character. It is not claimed that this plan will appear practicable from the standpoint of the politician, but from the standpoint of an engineer it would be much more satisfactory, and in the end, we think, much better. Many of the appropriations were entirely inadequate for the work contemplated, but on the theory that a poor road or bridge is better than none at all, the people interested demanded that the money be spent. Nearly all of the road appropriations were for the purpose of repairing or improving existing roads. As there was in no case money enough to rebuild the whole line, the question confronting the different boards of construction was how to distribute the work so as to get the most benefit from it. This question was, perhaps, not settled satisfactorily to all parties interested, but the boards of construction in all cases worked conscientiously, and in the main satisfactory results were obtained. In several instances appropriations were made to repair roads already built by the state and turned over to the various counties with the proviso that the same should be kept in repair by said counties. This action of the legislature has been sharply criticised, yet it is better, perhaps, to improve existing roads, if properly located, than to multiply roads in communities that are unable to properly maintain what they already have. This office was considerably handicapped by the fact that at the beginning of the term much of the fund appropriated was not available, so that work had to be taken up in the order in which the bills were approved; this prevented the planning of the work to suit the location, much of the road work, especially, being at a high altitude, which prevented the prosecution of it during winter months. This was the cause of many vexatious delays. The high price of steel interfered with the procuring of advantageous contracts during the year 1899, and in one instance a combination bridge had to be accepted, when under a more favorable market the appropriation was sufficient for a steel bridge.

The bids for the artesian wells were anything but satisfactory, and it is not likely that any present good results will be obtained from any of the appropriations for that purpose. It was decided, however, to proceed with the work, and all wells are to be cased and capped, so that at some future time they may be sunk deeper if necessary funds are provided.

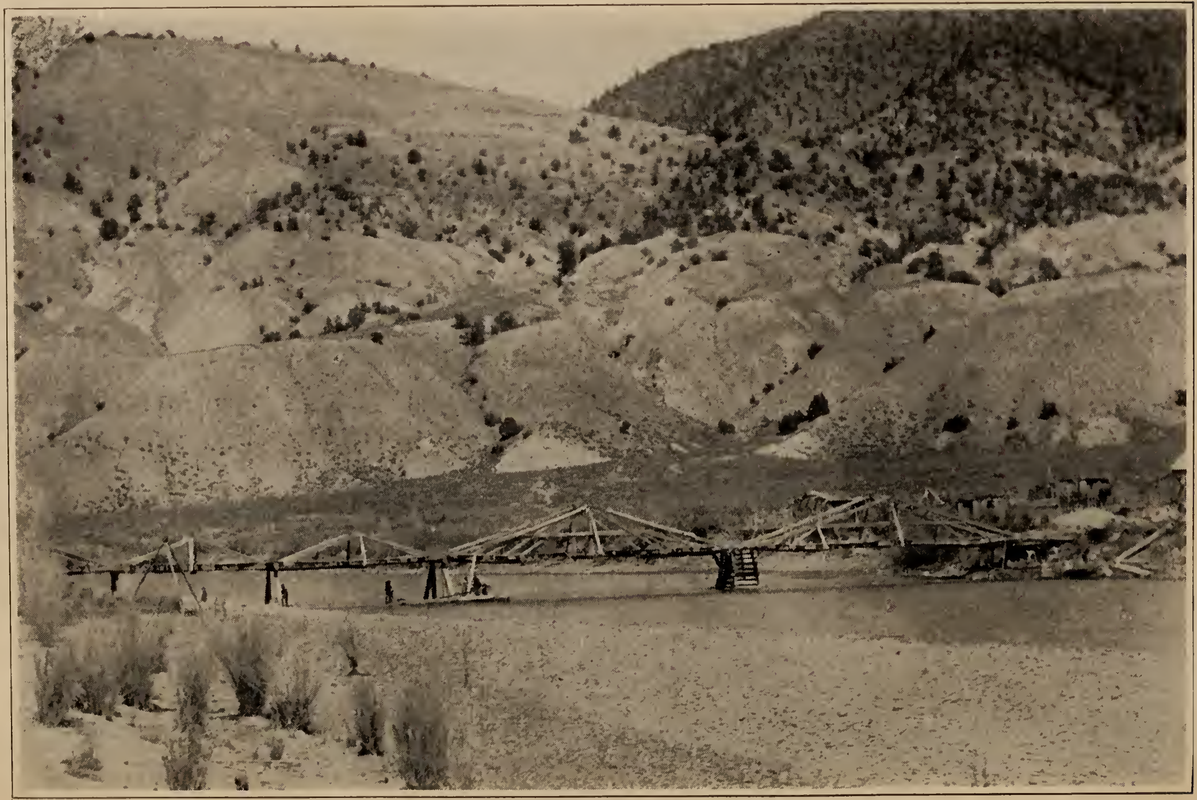
Work has not been commenced on the San Miguel county road, the Yuma, Washington and Morgan county road, and the Clear Creek county road, the funds not being available. It is thought they can all be reached by the opening of the spring of 1901.

ROARING FORK RIVER BRIDGE.

Senate Bill No. 133, appropriation $2,500.00, for the purpose of constructing a bridge across the Roaring Fork river, in Pitkin county, near the town of Basalt. The State Engineer and the chairman of the board of county commissioners of Pitkin county constituted the board of construction.

Proposals were received May 25, 1899, and the contract awarded M. J. Patterson, of Denver. The bridge consists of a steel span of 75 feet on steel tubular piers, and 60 feet of wood bridge on trestles. Some additional work upon the ap-

State Engineer,
Denver, Colo.



OLD BRIDGE ACROSS GRAND RIVER, DOTSERO, EAGLE COUNTY.

proaches was done by Pitkin county. The bridge was completed and accepted in August, 1899.

STATEMENT OF EXPENDITURES.

Appropriation		$2,500 00
Advertising plans and proposals	$ 8 60	
M. J. Patterson on contract	2,460 00	
State engineer, trips of inspection	17 80	
Typewriting and office work	4 60	
Balance unexpended	9 00	
Total	$2,500 00	$2,500 00

GRAND RIVER BRIDGE.

Senate Bill No. 510 appropriated $5,000.00 for the purpose of building a bridge of iron or steel across the Grand river, above the town of Dotsero, in Eagle county, the exact location to be determined by the board of construction. The board of construction consisted of the governor, State Engineer and chairman of the board of county commissioners of Eagle county. A site about four miles above Dotsero was chosen, and plans adopted for a bridge at that point. Before the contract was let the matter of location was canvassed and it was decided to build the bridge at the site of the old bridge, near the mouth of Eagle river, as at that point it would accommodate the travel up the Grand river as well as at the other location, and at the same time be on the line of the Arapahoe and Mesa county state road when built. Proposals were received and on December 30, 1899, the contract was awarded to the Pueblo Bridge Company, providing for one 150-foot span and two 50-foot spans, all steel, with steel tubular piers, with the approach ends resting on crib abutments. Upon laying out the work it was found necessary to have additional length of spans and a first-class masonry abutment on the east end.

Having found it practicable to proceed with the state road, it was deemed advisable, in order to have a bridge commensurate with the needs of a great state thoroughfare, to change the plans considerably, substituting one 125-foot steel span for the two 50-foot spans, and a masonry pier replacing one set of tubes, the price for said additional work being based upon the same items in the proposal submitted and to be paid out of the state road fund.

The work was done under the supervision of Theodore Rosenberg, C. E., of Glenwood Springs, and was completed and accepted in June, 1900.

STATEMENT OF EXPENDITURES.

Appropriation		$5,000 00
Advertising plans and proposals	$ 11 65	
Pueblo Bridge Company, on contract	4,730 00	
Theo. Rosenberg, engineer in charge	213 20	
Typewriting, etc	15 00	
State engineer, trips of inspection	26 50	
Balance unexpended	3 65	
Total	$5,000 00	$5,000 00

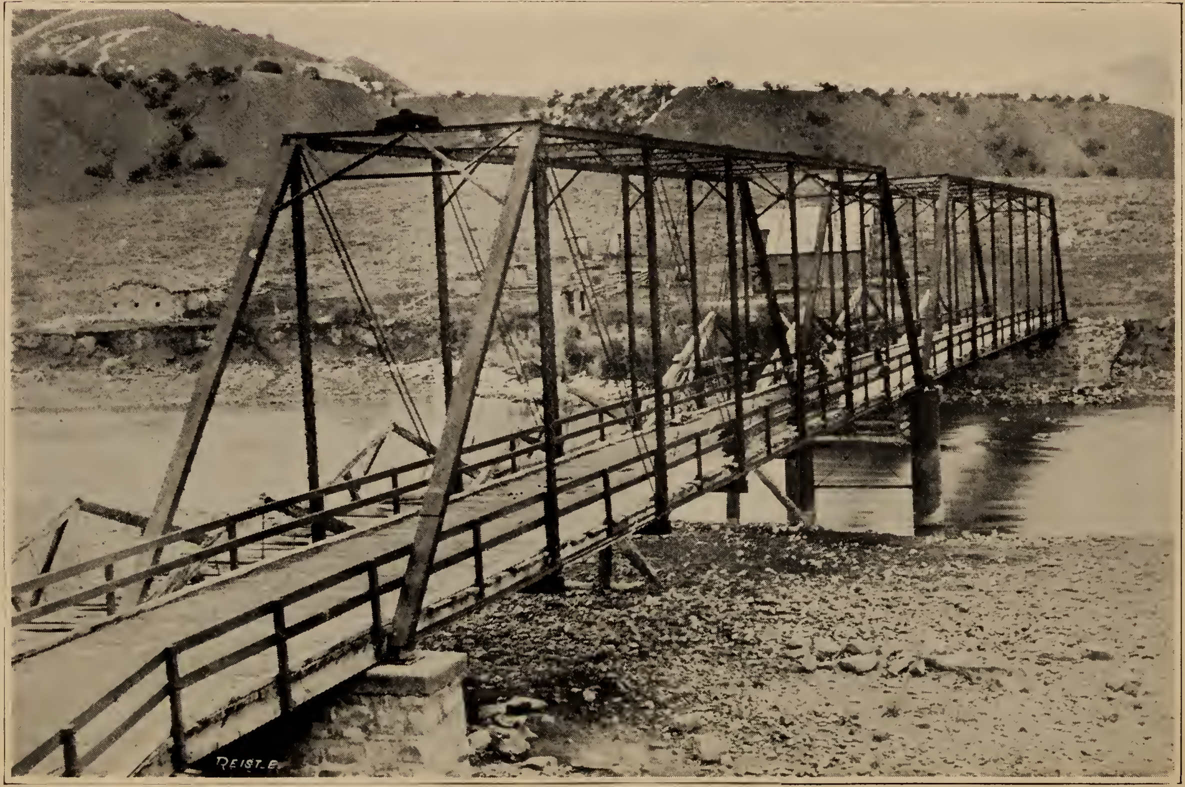
PALMER LAKE CYCLE PATH.

Senate Bill No. 408 appropriated $5,000 for the purpose of constructing a cycle path from the town of Littleton, in Arapahoe county, to Palmer Lake, in El Paso county.

The board of construction consisted of the State Engineer and three persons to be appointed by the governor of Colorado. The governor named Lucius W. Hoyt and J. A. McGuire of Denver, and Frank Ball of Castle Rock. The board held its first meeting March 22, 1900, and arranged to go over the route; after an examination of the country to be traversed by said path it was decided to survey two routes; first, from Sedalia up East Plum creek by way of Castle Rock to Palmer Lake; and second, from Sedalia by way of West Plum creek to Palmer Lake. Mr. Peter O'Brien was employed to make the necessary survey, and also to canvass the land owners to procure right of way. Mr. O'Brien reported the West Plum creek line to be the most feasible route; that he thought it possible to build the line along the present public highway within the appropriation, but that a better path could be secured. The board has been delayed in procuring the right of way, and no contract has been let. It is hoped that the work can be taken up with the beginning of another season and pushed to completion.

STATEMENT OF EXPENDITURES.

Appropriation		$5,000 00
Peter O'Brien, surveyor, on contract	$ 500 00	
Expense of board, examination of line	44 75	
Balance in the fund	4,455 25	
Total	$5,000 00	$5,000 00



NEW BRIDGE ACROSS GRAND RIVER, DOTSERO, EAGLE COUNTY.

CLEAR CREEK COUNTY ROAD.

Senate Bill No. 339 appropriated $5,000 for the purpose of constructing a wagon road from Silver Plume to McKay's ranch, in Clear Lake gulch.

The governor, State Engineer and chairman of the board of county commissioners of Clear Creek county constituted the board of construction. The bill authorizing this appropriation provided that if the same was insufficient to construct the road, no part should be expended excepting so much as was necessary in making the preliminary examination, surveys, etc., unless the board of county commissioners of Clear Creek county would agree to furnish the additional sum necessary to complete the same. A survey was ordered by the board of construction and proposals received July 23, 1900. No bids were received within the sum available out of the appropriation. The board of county commissioners by resolution refused to furnish the amount required in excess of the appropriation, or any amount to complete the road, consequently nothing further was done with this improvement.

F. A. Maxwell, C. E., of Georgetown, made the surveys and estimate.

STATEMENT OF EXPENDITURES.

Appropriation		$5,000 00
State engineer, trip—location	$ 4 55	
F. A. Maxwell and party, survey	84 20	
Advertising proposals	12 78	
Typewriting and office work	10 00	
Deputy state engineer, three trips inspection and board meetings	19 50	
Balance unexpended	4,868 97	
Total	$5,000 00	$5,000 00

MONTROSE COUNTY ROAD.

Senate Bill No. 350 appropriated $7,000 to construct a road from the town of Montrose in a southwesterly direction, terminating at the bridge across the San Miguel river, one mile below the Naturita postoffice.

The chairman of the board of county commissioners and county surveyor of Montrose county, together with the State Engineer, constituted the board of construction. This road crosses Pinon mesa, a plateau reaching an elevation of between 9,000 and 10,000 feet, and after a careful examination of the line it was decided to spend the greater part of the appropriation in constructing a new line, with lighter grades, from what is known as Iron Springs, near the top of the mesa, to where the old road strikes the valley at Sheep creek. A survey was run directly down the gulch from Iron Springs. This route was found to be too expensive, and another line was run which was found to be much cheaper, and by using a switch-back at the lower end equally as good grades were obtained. Bids were received and contracts let to Phil Peters, A. B. Green and Bowman & Brooks. The surveys were made by E. B. Sawyer and W. H. Fleming, and the work was done under the supervision of W. H. Fleming. The road was inspected and received in November, 1899.

STATEMENT OF EXPENDITURES.

Appropriation		$7,000 00
E. B. Sawyer, expenses of surveys	$ 549 95	
Advertising	21 70	
Typewriting and office work	10 50	
Typewriting	3 25	
Phil Peters, on contract	5,220 00	
A. B. Green, on contract	320 00	
Bowman & Brooks, on contract	465 00	
W. H. Fleming, surveys and superintendence	324 00	
State engineer, three trips of inspection	19 25	
Balance unexpended	66 35	
Total	$7,000 00	$7,000 00

EAGLE AND ROUTT COUNTY ROAD.

House bill No. 259 appropriated $2,000 for the purpose of constructing a state road from Wolcott, in Eagle county, to Yampa, in Routt county.

The governor, State Engineer and chairman of the boards of county commissioners of Eagle and Routt counties constituted the board of construction. The road was inspected in August, 1899, and Ben L. Cress of Red Cliff was employed to make the necessary surveys and estimates. Proposals were received on September 30, and a contract let to J. L. Herwick. The road was inspected and received in November, 1899.

STATEMENT OF EXPENDITURES.

Appropriation		$2,000 00
Ben L. Cress and party	$ 156 00	
Advertising proposals	15 26	
J. L. Herwick, on contract	1,800 00	
State engineer, trips inspection	16 50	
Balance unexpended	12 24	
Total	$2,000 00	$2,000 00

WHITE RIVER BRIDGE.

House bill No. 144 appropriated $2,000 for the purpose of constructing a bridge across White river, in Rio Blanco county, at Hay's ranch, ten miles below Meeker, at the mouth of Piceance creek. The governor, State Engineer and chairman of the board of county commissioners of Rio Blanco county constituted the board of construction.

Numerous protests were made to this office against the construction of this bridge, for the reason that the bill did not describe the location intended, as the first bill called for a bridge six miles above Meeker, at Danforth Crossing. On account of these protests, and also of the ambiguity in that part of the bill describing the location (Piceance creek being twenty miles below Meeker and ten miles below Hay's ranch), the board took no action upon the matter until the fall of 1900, when it was taken under consideration. The board concluded that the items of the bill were sufficiently explicit to justify them in making the location ten miles below Meeker, at Hay's ranch. Proposals were received on November 30, and the contract was awarded to M. J. Patterson on condition that the county of Rio Blanco or other responsible parties guarantee a balance sufficient to complete the work.

GRAND AND BOULDER COUNTY ROAD.

House bill No. 101 appropriated $7,500 in addition to the amount appropriated by an act of 1895 for the purpose of constructing a wagon road on the identical route named in said act of 1895. Upon learning that the fund provided in said act of 1895 had been disposed of by action of the board of construction created under said act, it was found not practicable to construct the road. The following resolution will more clearly set forth the disposition of this appropriation. At a meeting of the board of construction of the Grand and

Boulder county road, held in the office of the county clerk of Boulder county, there were present A. J. McCune, State Engineer, and W. A. Willis, chairman board of county commissioners of Boulder county. The following resolution was adopted:

Whereas, Under the opinion of the attorney general of Colorado heretofore rendered, the appropriation of the Tenth General Assembly for the construction of said road was held unavailable; and,

Whereas, From information obtained by surveys and estimates made by State Engineer W. A. Sumner, it appears that the amount appropriated by the Twelfth General Assembly is by said board of construction deemed wholly inadequate for the construction of said road, now therefore, be it

Resolved, That we, as a board, deem it unadvisable to spend any part of said appropriation of the Twelfth General Assembly upon said proposed road, and believe that the interests of the state will be better conserved by leaving the said appropriation intact in the internal improvement fund.

(Signed) A. J. McCUNE,
State Engineer.

W. A. WILLIS,
Chairman Board County Commissioners, Boulder County.

I endorse the above resolution.

(Signed) EDMUND BECKER,
Chairman Board County Commissioners, Grand County.

GARFIELD COUNTY ARTESIAN WELL.

House bill No. 157 appropriated $2,500 for the purpose of sinking a well in Gross valley, at or near Antlers, to be used for supplying water for irrigation and domestic purposes.

The board of construction consisted of the governor, State Engineer and the board of county commissioners of Garfield county. The board made a careful examination of the valley in May, and the site was selected in the southeast quarter, southwest quarter, southwest quarter section 35, township 5 south, range 92 west, the owner of the land agreeing to deed five acres upon which the well is situated to Garfield county. Proposals were received at the county clerk's office, Glenwood Springs, on the 28th of September, and the best bid was obtained from Max Grossmeyer, who agreed to sink a well 513 feet and case it for the appropriation.

The board considered from the best information available that no beneficial results could be obtained at the depth named, and consequently rejected all bids.

On April 21, 1900, bids were again called for to be received at the county clerk's office at Glenwood Springs. One bid was received, the bidder agreeing to sink 1,000 feet without casing. This bid was accepted, provided the bidder would enter into contract and give satisfactory bond to complete the work. This he failed to do, and the matter was dropped. Later on interested parties urged the sinking of the well, and a contract was entered into with the Bullen Bridge Company to sink and case to a distance of 525 feet. This work is now under way.

CHEYENNE COUNTY WELL.

House bill No. 28 appropriated $4,000 for the purpose of sinking a well on state land, in township 14 south, range 44 west, sixth principal meridian, in Cheyenne county, for the purpose of testing the flow of artesian water and prospecting for oil, minerals, etc.

The governor, State Engineer and chairman of the board of county commissioners of Cheyenne county constituted the board of construction. Deputy State Engineer Rod S. King inspected the location of the well in the summer of 1899. He found that there had already been sunk in the vicinity of this location three wells to a depth greater than could be reached with this appropriation. Nothing further was done in the matter until September 1, 1900, when proposals were received, but no satisfactory bids being obtained the time was extended to September 28. The contract was closed with the Bullen Bridge Company to sink 750 feet and case the same for $3,800. The work is now under way.

SAGUACHE COUNTY ARTESIAN WELL.

House bill No. 223 appropriated $5,000 for the purpose of sinking an artesian well in section 6, township 44 north, range 8 east, N. M. meridian, in Saguache county.

The governor, State Engineer and county judge of Saguache county constituted the board of construction. In June, 1900, Deputy State Engineer Rod S. King visited the site and examined into the conditions with a view of determining the feasibility of the project, and after careful study of the same he reported that it was not probable that water could be obtained in sufficient quantity to fill the reservoir or of sufficient quantity to be of any benefit. A report from Professor Carpenter also stated that it was not probable that artesian water could be obtained in that vicinity.

Section 3 of the bill authorizing this improvement practically leaves the matter of the expenditure of this appropriation to the State Engineer. From the reports received and from other information obtained upon the subject, believing the benefits to be derived would not be commensurate with the outlay, he recommended to the board of construction that the well be not sunk. Notwithstanding said recommendation, in view of the fact, as stated in the bill, that said well was for the purpose of testing lands for oil, coal and other minerals, the same being for experimental purposes, the board decided to sink the well and the State Engineer was ordered to advertise for bids. Proposals were received and a contract was awarded to the Bullen Bridge Company to sink 1,100 feet for $4,750. The work is now under way.

ARAPAHOE AND MESA COUNTY WAGON ROAD.

Senate bill No. 1 appropriated $35,000 for the purpose of constructing a wagon road from the city of Denver, in Arapahoe county, to Grand Junction, in Mesa county, and described the route to be followed between the two points named.

The governor, State Engineer and chairmen of the board of county commissioners of each county traversed, constituted the boards of construction for each county respectively. It was left to the State Engineer to determine the definite location of the line and at what points the money should be expended. Owing to the very small amount of funds available for a work of such magnitude, this was a perplexing question. After studying the route as could best be done from the maps available, it was concluded to cut through the canon of the Grand river, from its junction with the Eagle river, to the mouth of Grizzly creek, seven miles above Glenwood Springs, connecting with a road already built to that point. The present road across this part of the state is up Gypsum creek, across Cottonwood pass, which is impassable for a considerable time in the winter season on account of snow, and down Roaring Fork to Glenwood Springs. This cutting through the Grand River canon will save some twenty miles in distance, give a route on a water grade and be open the year around. It will also provide for a large amount of new local travel. It was also decided to improve the line across Tennessee pass and to construct three steel bridges on the road as it is now traveled in Eagle county, and do a small amount of grading on the same. These improvements were made at points where there is no doubt as to the proper location of the road. This appropriation became available too late in the season to prepare for all the work, as that part contemplated on the east side of the range requires a careful study and considerable field work in order to make an intelligent expenditure of the money. A contract was awarded September 29 to the Bullen Bridge Company for the road and bridge work in Eagle county for $6,505, including additional work on the Dotsero bridge, and to Henry Morrell, of Glenwood Springs, for the work in Garfield county for $20,000. The Eagle county work is approaching completion, and the Garfield county work is progressing satisfactorily.

GILPIN COUNTY ROAD.

House bill No. 208 appropriated $3,000 to construct and repair a wagon road running from the town of Black Hawk, Gilpin county, westerly via Apex to the town of Nugget, in the same county. The State Engineer and chairman of the board of county commissioners of Gilpin county constituted the board of construction.

After an inspection of the road the work was found to be of such a nature that it could not be performed satisfactorily by contract. It was therefore done by day's labor under the supervision of Mr. Ed. C. Hughes, chairman of the board of county commissioners of Gilpin county. The work was completed about August 1, 1899.

STATEMENT OF EXPENDITURES.

Appropriation		$3,000 00
G. W. Schneider and party, surveys	$ 42 50	
Typewriting and clerical work	10 00	
Work under superintendent	2,462 80	
Deputy state engineer, three trips of inspection	20 00	
Balance in fund unexpended	464 70	
Total	$3,000 00	$3,000 00

LARIMER AND ROUTT COUNTY ROAD.

Senate bill No. 445 appropriated $6,000 for widening and improving the state wagon road from the town of Belvue, in Larimer county, to Steamboat Springs, in Routt county. The board of construction consisted of the governor, State Engineer and the chairmen of the boards of county commissioners of Larimer and Routt counties. In July, 1899, the Deputy State Engineer and the two county chairmen inspected the road and agreed upon the necessary work to be done, and Mr. Wm. Rist was employed to make the survey and estimate. Bids were called for and the contract was let on August 25 to F. E. Baxter, the work to be completed during the year 1899. This road crosses two high ranges of mountains, and a severe snow storm came on early in October, making it impossible to prosecute the work in a satisfactory manner. The contractor was therefore given an extension of time until the summer of 1900. The work was completed and accepted in September, 1900.

STATEMENT OF EXPENDITURES.

Appropriation		$6,000 00
W. Rist and party, surveys	$ 158 50	
Typewriting, bonds, contracts, clerical work	15 00	
F. E. Baxter, on contract	5,400 00	
Extra work ordered by board	363 34	
Deputy state engineer, three trips of inspection	62 95	
Balance unexpended	21	
Total	$6,000 00	$6,000 00

MINERAL COUNTY ROAD.

Senate bill No. 116 appropriated $12,000 for the purchase and construction of a wagon road extending from Wagon Wheel Gap north to a point one mile north of the town of Creede, in Mineral county.

The board of construction consisted of the governor, the State Engineer and chairman of the board of county commissioners of Mineral county. The road as described in the act consisted principally of what was known as the Wasson toll road, which extended from a short distance below the town of Wasson to one mile above the said town of Creede. This road was purchased for the sum of $10,000, leaving $2,000 for additional road work, the construction of a bridge across the Rio Grande river and the expenses of the commission. Proposals were received for the bridge work and the contract let June 19, to the Pueblo Bridge Company for a combination wood and iron structure for $1,250.00. Bids were called for upon the necessary road work and the contract let to J. D. Henderson for $250.

All work was completed and accepted in September, 1899.

STATEMENT OF EXPENDITURES.

Appropriation		$12,000 00
Sid Remsen and party, surveys, etc	$ 78 00	
Advertising for proposals	14 97	
J. D. Henderson, on contract, road	250 00	
Pueblo Bridge Company, on contract	1,250 00	
Purchase, M. V. B. Wason, toll road	10,000 00	
Henry Brandt, inspector of construction	337 50	
Typewriting and office work	20 00	
Deputy state engineer, four trips of inspection	34 25	
Balance in fund unexpended	15 28	
Total	$12,000 00	$12,000 00

JEFFERSON COUNTY ROAD.

House bill No. 516 appropriated $8,000 to complete the construction of a wagon road between the town of Morrison and the postoffice at Evergreen, in Jefferson county, Colorado, along the course of Bear creek.

The governor, State Engineer and chairman of the board of county commissioners of Jefferson county constituted the board for the purpose of constructing said road. The route was examined by the board on August 14, 1899, and Captain E. L. Berthoud was employed to make the necessary surveys. Bids for the construction of said road were advertised for and contract awarded to John Kirby of Morrison. The board subsequently awarded a contract for a steel bridge across Dry gulch to the Pueblo Bridge Company. Some additional widening and repairs were done by the superintendent. John M. Hobbs superintended the construction and the work was completed and received in January, 1900.

STATEMENT OF EXPENDITURES.

Appropriation		$8,000 00
E. L. Berthoud and party, surveys	$ 354 33	
John Kirby, on contract	6,100 00	
Extra work ordered by board	283 50	
Pueblo Bridge Company, on contract	900 00	
John M. Hobbs, inspector of construction	200 00	
Typewriting and clerical work	15 00	
Balance unexpended	147 17	
Total	$8,000 00	$8,000 00

BLUE RIVER BRIDGE.

Senate bill No. 43 appropriated $5,000 for the construction of a wagon bridge across the Blue river at what is known as Mumford's Crossing, in Summit county. The board of construction consisted of the governor, the State Engineer and the chairman of the board of county commissioners of Summit county.

The site was inspected June 4, 1899, and the place selected was at the location of the old bridge. Bids for the construction were called for and the contract was let July 14 to M. J. Patterson of Denver. The bridge consists of two steel spans of 85 feet each, upon good stone abutments and pier, and is in every way a substantial structure. The work was under the supervision of D. W. Fall, chairman of the board of county commissioners in Summit county.

The bridge was completed and accepted in October, 1899.

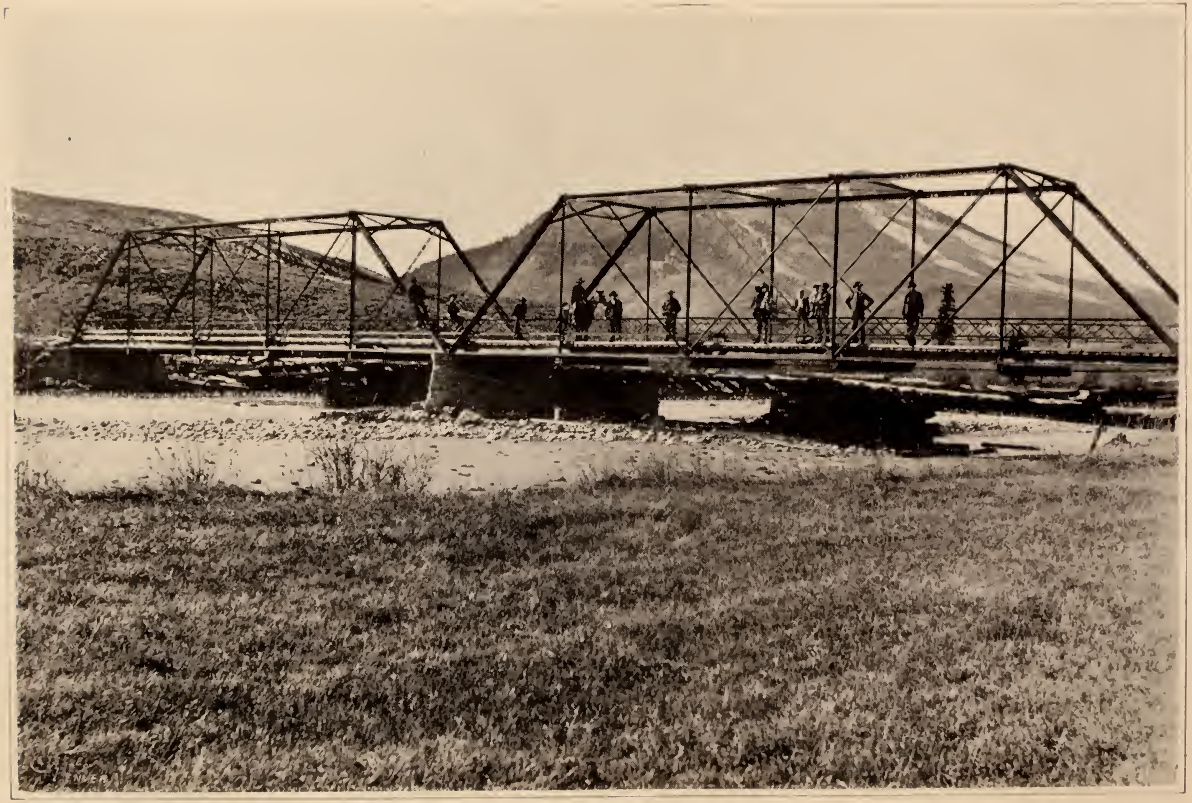
STATEMENT OF EXPENDITURES.

Appropriation		$5,000 00
Advertising for plans and proposals	$ 25 46	
M. J. Patterson, on contract	4,486 00	
Extra work ordered by board	135 00	
D. W. Fall, inspector of construction	270 00	
Typewriting and clerical work	12 50	
State engineer, two trips of inspection	13 50	
Balance unexpended	57 54	
Total	$5,000 00	$5,000 00

TRINIDAD AND STONEWALL ROAD.

Senate bill No. 479 appropriated $5,000 for the purpose of repairing and widening the state wagon road from Trinidad to Stonewall, in Las Animas county.

The board of construction consisted of the State Engineer, the county surveyor and chairman of the board of county commissioners of Las Animas county. The road was inspected in June, 1899, by the Deputy State Engineer, county surveyor and chairman of the county board, and J. F. Ramey, county surveyor, was instructed to make the necessary surveys and prepare specifications for the work to be done. It was decided to let the road work in two contracts and the bridge work separate from the road work. Bids were called for and on September 16, 1899, the contracts for the



BLUE RIVER BRIDGE, SUMMIT COUNTY.

road work were let to Peter Fischer and F. B. Cordova, and the bridges to the Pueblo Bridge Company. The work was under the supervision of J. F. Ramey, and was inspected and received in December, 1899.

STATEMENT OF EXPENDITURES.

Appropriation		$5,000 00
J. F. Ramey and party, surveys	$ 75 00	
Advertising for proposals	23 40	
Peter Fischer, on contract No. 1	2,115 65	
F. B. Cordova, on contract No. 2	1,960 00	
Pueblo Bridge Company, on contract	500 00	
J. F. Ramey, engineering and inspection	150 00	
Typewriting and clerical work	17 50	
Deputy state engineer, four trips inspection	40 50	
Balance in fund unexpended	117 95	
Total	$5,000 00	$5,000 00

REPUBLICAN RIVER BRIDGE.

House bill No. 176 appropriated $1,200 to construct a wagon bridge across the Republican river, in Arapahoe county, on the east line of range forty-four. The State Engineer and chairman of the board of county commissioners of Arapahoe county constituted the board of construction. Bids were called for and a contract was awarded August 21, 1899, to the Pueblo Bridge Company for $1,100.

The bridge consists of one combination wood and iron span fifty feet in length, on pile piers, and two approach spans of ten and twenty feet respectively, with earth fills. The work was done under the supervision of T. G. Price and was completed and received in November, 1899.

STATEMENT OF EXPENDITURES.

Appropriation		$1,200 00
Advertising plans and proposals	$ 7 61	
Pueblo Bridge Company, on contract	1,100 00	
T. G. Price, inspector of construction	35 00	
Deputy state engineer, two trips inspection	21 50	
Typewriting, contracts, bonds—clerical work	10 00	
Balance unexpended	25 89	
Total	$1,200 00	$1,200 00

SNAKE RIVER BRIDGE.

House bill No. 131 appropriated $3,000 for the purpose of constructing a wagon bridge across Snake river, in Routt county, at Thompson's Crossing, the exact location to be determined by the board of construction. The governor, State Engineer and chairman of the board of county commissioners of Routt county constituted the board of construction.

Owing to the width of the stream at the ford at Thompson's ranch, and the treacherous character of the bed of the same, making foundations very expensive, it was found that the appropriation was entirely inadequate to build a substantial structure at that point. Consequently a site was chosen about two miles lower down the stream, where very favorable conditions were found, one bank being a limestone bluff, making a very small abutment necessary, and bed rock within a very few feet of the bed of the river. Bids were called for and the contract let on September 27 to the Midland Bridge Company of Kansas City. The plans adopted provided for a combination wood and iron span of 110 feet, with 14 feet roadway, all truss timbers to be of Oregon fir, and substructure of masonry. The work was contracted to be completed in 1899, but an early snow in October blockaded the roads, making it impossible to get the material freighted the long distance that was necessary without great expense. The work was therefore laid over until the summer of 1900. The work was done under the supervision of Wm. Rose, C. E., of Craig, Colorado, and was completed and accepted in September, 1900.

STATEMENT OF EXPENSE.

Appropriation		$3,000 00
Advertising plans and proposals	$ 6 27	
Midland Bridge Company, on contract	2,775 00	
W. H. Rose, engineer and inspector of construction	199 50	
Typewriting	8 50	
State engineer, expenses one trip	10 50	
Balance unexpended	23	
Total	$3,000 00	$3,000 00

SOUTH PLATTE RIVER BRIDGE.

Senate bill No. 161 appropriated $3,000 to construct a wagon bridge across the South Platte river, in Morgan county, within two miles of the postoffice of Deuel. The governor, State Engineer and chairman of the board of county commissioners of Morgan county constituted the board of construction.

Owing to the great width of the river in that vicinity some plan of pile bridge had to be adopted as being the only type of bridge that could be reached with the appropriation. Bids were called for and the contract let to the Pueblo Bridge Company calling for a bridge 940 feet in length, 12 feet roadway in the clear, three oak piles to each bent, well driven and sway-braced. The plans were furnished by F. E. Baker, and C. W. Kinkle was inspector of construction.

The bridge was completed and accepted in December, 1899.

STATEMENT OF EXPENDITURES.

Appropriation		$3,000 00
Advertising for plans and proposals	$ 17 02	
Frank E. Baker, adopted plans	25 00	
Frank E. Baker, locating engineer	24 00	
Pueblo Bridge Company, on contract	2,780 00	
C. W. Kinkel, inspector of construction	100 00	
Typewriting, etc	15 00	
Deputy state engineer, trips inspection	16 50	
Balance unexpended	22 48	
Total	$3,000 00	$3,000 00

ARKANSAS RIVER BRIDGE.

Senate bill No. 206 appropriated $6,000 for the purpose of constructing a state bridge across the Arkansas river, in Otero county, at or near the west line of range 55 west.

The governor, State Engineer and chairman of the board of county commissioners of Otero county constituted the board of construction. Proposals were received and the contract awarded to the Pueblo Bridge Company, said contract calling for one 150-foot combination span and eleven spans of 20 feet each on piles, with a clear roadway of 16 feet. The combination span to rest on 4-foot steel tubes, and all truss timbers, floor beams and guard rails to be of Oregon fir. The 20-foot spans are of native lumber, resting on white oak piling, four piles to each bent. F. T. Lewis was supervising engineer during construction. The bridge was completed and received in January, 1900.

STATEMENT OF EXPENDITURES.

Appropriation		$6,000 00
Advertising plans and proposals	$ 25 64	
Pueblo Bridge Company, on contract	5,850 00	
F. T. Lewis, engineer in charge construction	80 00	
W. N. Randall, expenses board meeting	14 30	
State engineer, two trips inspection	14 90	
Typewriting and office work	15 00	
Balance unexpended	16	
Total	$6,000 00	$6,000 00

LA PLATA COUNTY ROAD.

House bill No. 371 appropriated $3,000 for the purpose of constructing and repairing a wagon road from Parrott P. O. northward along the right bank of the La Plata river to the mouth of Silver Lake basin in La Plata county.

The governor, State Engineer and chairman of the board of county commissioners constituted the board of construction. In October, in company with Hon. Blair Burwell, C. E., the State Engineer went over the road and determined the work to be done, and Mr. Burwell was employed to make the necessary survey and prepare specifications. It was thought best to divide the work into several sections and let the same in several contracts, and to make some of the repairs by day's work under a foreman. On April 14 contracts were let to M. C. Van Deventer, J. C. Bradford and W. H. Skidmore, and the day's work under John L. Jones as foreman. Blair Burwell superintended the construction. The work was completed and accepted in June, 1900.

STATEMENT OF EXPENDITURES.

Appropriation		$3,000 00
State engineer, trip location	$ 13 50	
Blair Burwell and party, survey	127 10	
Advertising proposals	3 60	
M. C. Van Derventer, on contract, sections 2, 3 and 5	558 00	
J. C. Bradford, on contract, section 7	790 00	
W. H. Skidmore, on contract, section 8	150 00	
Work under superintendent	1,207 85	
Blair Burwell, inspection of construction	18 70	
J. C. Bradley, inspection of construction	43 80	
Typewriting and office work	15 00	
Deputy state engineer, four trips of inspection	60 50	
Balance unexpended	11 95	
Total	$3,000 00	$3,000 00

THE GUNNISON RIVER BRIDGE.

House bill No. 45 appropriated $6,000 for the purpose of constructing a bridge across the Gunnison river, in Mesa county, near the town of Whitewater.

The governor, State Engineer and chairman of the board of county commissioners of Mesa county constituted the board of construction. Proposals were received and a contract let to the Bullen Bridge Company. The bridge is to consist of two steel spans of 145 feet each on masonry abutments, with steel tubular pier in center, and is to be a first-class structure in every particular. The work is now under way and the contract is to be completed in January, 1901.

HINSDALE COUNTY ROAD.

House bill No. 50 appropriated $18,000 for the purpose of constructing a wagon road commencing in Hinsdale county, at a point near Argenta Falls, below Lake San Christoval, and running thence up Lake Fork of the Gunnison river to Burrows Park, thence across the range to intersect the present wagon road leading from Silverton to Animas Forks. This road runs substantially along the route surveyed by J. J. Abbott under an appropriation made by the Eighth General Assembly.

The board of construction consisted of the State Engineer, the county surveyor (Mr. J. J. Abbott for 1899 and George R. Denise for 1900) and the chairman of the board of county commissioners for Hinsdale county (J. R. Paterson for 1899 and C. W. Wager for 1900), together with a resident taxpayer of each of the counties of Hinsdale and San Juan, to be appointed by the governor. D. A. Farrell was appointed for Hinsdale county and John F. Melton for San Juan county. The route was viewed by the board in May, 1899, and Jas. W. Abbott was employed to make the necessary surveys and estimates. It was decided to divide the work into several sections, and call was made for bids on the work on what is known as Sherman hill (designated as section 1), and also on the line along San Christoval (section No. 2). The bids were opened on July 10, 1899. No satisfactory bid being received for section No. 1, all bids were rejected by the board and the work readvertised for one week. Satisfactory bids having been received, the contract for section No. 1 was awarded to Theo. Watson & Co. The contract for section No. 2 was awarded to Geo. J. Richards. The board decided to have the balance of the work done by day's work. Byron Coffin was employed to superintend the construction work. Many vexatious delays in this work occurred for various reasons, partly by reason of disagreement with the contractors as to the character of the work demanded, partly by some disagreement among the members of the board of construction as to the policy to be pursued, and also by reason of claims for damages for right of way. None of the contract work was completed in 1899. In July, 1900, section 1 was accepted on the condition that $500 be retained by the board to do some additional work designated to be done by the board in order to complete the contract. Section 2 was accepted in December, 1900, and the account closed.

STATEMENT OF EXPENDITURES.

Appropriation		$18,000 00
J. W. Abbott, engineer and expense, survey	$ 942 61	
Advertising	21 25	
Watson & Co., contractors, section No. 1	6,750 00	
Geo. J. Richards, contractor, section No. 2	2,300 00	
J. M. Corrothers, right of way	250 00	
Sweet & Co., right of way	150 00	
Expenditures under superintendent	6,925 80	
Byron Coffin, superintendent	512 00	
State engineer, expenses, trips to road	44 75	
*Balance unexpended	103 59	
Total	$18,000 00	$18,000 00

CLEAR CREEK AND GRAND COUNTY ROAD.

House bill No. 74 appropriated $6,000 for the construction and repair of the wagon road from Empire, in Clear Creek county, crossing the range at Berthoud pass, thence by way of Hot Sulphur Springs to the western boundary of Grand county.

The board of construction consisted of the State Engineer and the chairmen of the boards of county commissioners of Clear Creek and Grand counties. After an examination of the line it was thought best to spend the greater part of the appropriation belonging to Grand county beween Berthoud pass and Frazer, except what was necessary for the building of a bridge across the Grand river at Hot Sulphur Springs (the old one having been washed away by the spring floods of 1899), and the necessary approaches to the same. Proposals were received for the bridge work on

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*This balance has since been expended.

June 5, and the contract awarded to the Pueblo Bridge Company. The structure consists of two 36-foot spans and one 60-foot span combination on substantial masonry piers and abutments. The piers were built about twenty-five years ago by Mr. Wm. N. Byers and associates. The superstructure, which was of wood, having rotted away, Mr. Byers and his heirs very generously deeded the piers and right of way to Grand county for the use of the public.

The work upon the road consisted entirely of patch work and repairs, and of such a nature that it was impossible to contract to advantage, consequently the board deemed it best to have it done by day's work under a superintendent. The work for 1899 in Grand county was superintended by L. D. C. Gaskill, and in Clear Creek county by Duncan Drummond. For 1900 it was superintended in Grand county by Edmund Becker, and in Clear Creek county by Jerry Buckley.

STATEMENT OF EXPENDITURES.

Appropriation		$6,000 00
State engineer, one trip, location	$ 6 15	
Advertising, contracts, etc	10 10	
Pueblo Bridge Company, on contract	1,095 00	
Work under superintendent in Clear Creek and Grand counties	4,801 16	
Typewriting, contracts, specifications, etc	15 00	
Deputy state engineer, inspection	13 50	
Balance unexpended	69 09	
Total	$6,000 00	$6,000 00

DOUGLAS COUNTY ROAD.

House bill No. 368 appropriated $10,000 for the purpose of constructing a wagon road from a point on the Denver and Colorado Springs road near the junction of Jackson and Plum creeks, in Douglas county, and running thence southwesterly to connect with the public road on Trout creek.

The governor, State Engineer and chairman of the board of county commissioners of Douglas county constituted the board of construction. The length of this road as surveyed is 21.1 miles, extending up Jackson creek across a divide and down Trout creek to its junction with what is known as Horse creek, and extending for much of the way along the line of a road that had been in use for many years, the last three miles of which was on a very low grade near the bed of Trout creek. After an inspection of the line it was decided that this last part of the road be adopted as a part of the line, except that a few slight repairs be made and a good bridge be placed across Trout creek where the road joins on to the public road on Horse creek.

A survey was made and proposals were received for the construction of the other portions of the road which it was decided to build on August 26, 1899, and also for the bridge at mouth of Trout creek. The road work was awarded to J. L. Smith of Sedalia, and the bridge to the Pueblo Bridge Company, and was completed and accepted in December, 1899.

The survey was made and estimate prepared by M. C. Hinderlider, C. E. The construction work was superintended by Cole Briscoe and Deputy State Engineer Rod S. King. The extraordinary floods of the spring of 1900 completely destroyed the part of the old road mentioned above lying along the line of Trout creek, and the board of construction decided to build this part of the line on a high grade entirely out of the reach of floods. The line was staked out and proposals were received September 22, and J. L. Smith having the lowest bid the contract was awarded to him.

The work under this contract was completed and accepted December, 1900.

STATEMENT OF EXPENDITURES.

Appropriation		$10,000 00
M. C. Hinderlider, engineer, assistants, survey	$ 397 45	
Advertising contracts, etc	28 55	
L. K. Smith, contracts	8,275 00	
Pueblo Bridge Company, contract	800 00	
Typewriting, clerical work	21 25	
Cole Briscoe, superintendent of construction	125 00	
Deputy state engineer, five trips inspection	28 50	
Balance unexpended	324 25	
Total	$10,000 00	$10,000 00

CHAPTER III.

ABSTRACT OF SUPREME COURT DECISIONS.

(3639.)

THE PLATTE VALLEY IRRIGATION CO. VS. THE BUCKERS IRRIGATION, MILLING AND IMPROVEMENT CO.

25th Colorado, page 77.

1. Water Rights—Percolation—Presumption—Decision.

Where water flowing in a natural channel reaches the banks of a stream and there disappears in the sands of the bed, it will be presumed that it augments the flow of water in the main stream by percolation until the contrary is shown.

2. Water Rights—Tributaries—Increased Flow.

Where a party by his own efforts and expenditures has increased the flow of water in a tributary to a stream, he is entitled to the use of the water to the extent of the increase, but he is not entitled to appropriate the original flow as against prior appropriators from the main stream.

3. Water Rights—Prior Appropriations—Tributaries.

The rights of a prior appropriator from a stream can not be impaired by a subsequent appropriation of water from its tributaries, and this doctrine applies where the tributary enters the main stream below the point where the prior appropriator makes his diversion.

(3721.)

THE PRESBYTERIAN COLLEGE OF THE SOUTHWEST ET AL. VS POOLE.

25th Colorado, page 50.

Water Rights—Adjudication of Priorities—Jurisdiction—Decision.

Where a water district extends into two or more counties, and an action is brought in the district court of the proper county to adjudicate the priorities of rights to the use of water in such district, such court acquires and retains exclusive jurisdiction to adjudicate such priorities in said district.

Louden Canal Co. vs. Handy Ditch Co., 22d Colorado, page 102.

(No. 3607.)

THE WATER SUPPLY AND STORAGE CO. VS. THE LARIMER AND WELD RESERVOIR CO. ET AL.

25th Colorado, page 87.

1. Water Rights—Tributaries—Parties—Decision.

An appropriator of water from a stream may require a junior appropriator from a tributary which joins the stream below the point of intake of the former's ditch, to surrender his use of water in favor of appropriations, senior to both, below the point where the tributary joins the stream, before the former appropriator surrenders his use.

2. Waste Water Returned to Stream.

Waste water from irrigating ditches which is again returned to the stream or its tributaries, becomes a part of the stream the same as though never diverted, and inures to the benefit of appropriators in the order of their appropriations.

The Platte Valley Irrigation Co. vs. The Buckers Irrigation, Milling and Improvement Co., 25th Colo., page 78.

(No. 3797.)

THE X. Y. IRRIGATING DITCH CO. VS. THE BUFFALO CREEK IRRIGATION COMPANY.

25th Colorado, page 529.

In this case it is held that in an adjudication of priorities of water rights no waste of water should be tolerated by the courts, and decrees for its use should be withheld in the absence of evidence showing, inter alia, the quantity continuously applied to some beneficial use, but no fixed rule can be laid down as to what amount and kind of evidence of the acreage continuously irrigated should be necessary. The decree in each case must rest upon the facts in that case.

19th Colorado App., 438.

(No. 3772.)

WILSON VS. WARD ET AL.

26th Colorado, page 39.

This action was commenced by appellees, as plaintiffs in the court below, to restrain appellant as defendant from operating two wells upon his own lands, which, it is alleged, drew the water from Lone Tree creek, which was already appropriated by appellees. As the testimony showed that the pumps drew no water actually flowing in the channel of the Lone Tree creek, and as appellees made no claim to the percolating waters before they reach the stream, the judgment of the lower court was reversed and the case remanded, with directions to dissolve the injunction.

(No. 3786.)

THE COLORADO MILLING AND ELEVATOR CO. VS. THE LARIMER AND WELD IRRIGATION COMPANY.

26th Colorado, page 47.

The opinion in this case decides that:

First—The appropriation of water for a specific purpose, and a decree adjudicating the right to such appropriation, not only limits the use to the amount appropriated, but also to the quantity necessary for purpose for which it is appropriated.

New Mercer Ditch Co. vs. Armstrong, 21 Colorado, 357.

Second—An appropriator of water from a stream already partly appropriated acquires a right to the surplus or residuum he appropriates, and the prior appropriators can not enlarge their use of water to his prejudice, but are limited to their rights as they existed at the time the subsequent appropriator acquired his rights.

Third—An appropriation of water for irrigation purposes may be changed to a use for storage, but such change cannot be made to the detriment of other appropriators whose rights are subsequent to the appropriation for irrigation, but prior to the appropriation for storage. When the water in the stream is needed by the subsequent appropriators, the diversion of the prior appropriator for storage purposes would be limited to what he was entitled to divert for irrigation purposes, both as to amount and time of diversion.

Fourth—Rights to the use of water acquired prior to the adoption of the Constitution are not affected by the provisions of that instrument relating to priority as determined by the character of use.

(No. 3806.)

BROWN ET AL. VS. THE FARMERS' HIGH LINE CANAL AND RESERVOIR CO.

26th Colorado, page 66.

Injunction: The plaintiffs in error, twenty-three in number, instituted this action in the district court of Jefferson county to restrain the defendant in error from compelling them to pro rate water with its stockholders and others whose appropriations were subsequent to theirs.

Held: That in an action by the several users of water from a ditch, who acquired their rights by the original construction and first enlargement, to restrain the company from compelling them, in times of scarcity, to pro rate with others using water from the ditch who acquired their rights to the use of water by subsequent enlargements, the parties claiming the right to pro rate are necessary parties, and must be joined as co-defendants with the ditch company.

Injunction denied.

(No. 3752.)

NIPPEL VS. FORKES ET AL.

26th Colorado, page 74.

First—In this case it is held that a party is not entitled to an easement over any public land for a reservoir used in connection with a water right, until he has first acquired a vested and accrued water right.

Second—The locator of such a reservoir acquires no right of way over lands already located and for which the government has issued a final receiver's receipt prior to the approval of the reservoir site.

(No. 3705.)

THE LAMAR CANAL CO. VS. THE AMITY LAND AND IRRIGATION CO. ET AL.

26th Colorado, page 370.

1. The title of an act, Session Laws 1881, page 161, Mills' Ann. Stats., Sec. 2294, reads: "An act to provide for the extension of the right of way for ditches, canals and

feeders of reservoirs in certain cases, and requiring registration of all such hereafter made or enlarged." Held, that the subject matter of section 2 of this act is not clearly stated in the title, and that it is in violation of section 21, article 5, of the Constitution and void.

2. On rehearing of a cause on appeal parties will not be permitted to raise new questions not before raised in the case.

(No. 3836.)

KERR VS. DUDLEY ET AL.

26th Colorado, page 457.

It is held in this case that where in an adjudication of water rights an appropriator has been awarded all to which he is entitled, both as to volume and time, he cannot on appeal complain of awards to others not affecting his rights, though they may have been erroneous, or based on insufficient evidence.

LOWER LATHAM DITCH CO. VS. LOUDEN IRRIGATING CANAL CO. ET AL.

Pacific Reporter, Vol. 60, page 629 (March 5, 1900).

1. It is decided in this case that the decrees of the several districts in the division must be considered as one, and the distribution of water must be made in accordance with the order of priority in the division.

2. That the claim that on account of the character of the bed of the river the water would be wasted if turned down, as there was no evidence to show that the water would not eventually reach plaintiff's headgate if allowed to flow down the creek. This defense was not established. Judgment was rendered directing that the waters of the Big Thompson and South Platte be distributed in accordance with the decrees rendered in water districts Nos. 2 and 4.

WRIGHT VS. PLATTE VALLEY IRRIGATION CO.

Pacific Reporter, page 606, Vol. 61 (May 21, 1900).

1. It is held in this case that the contract with the ditch company for water to be used on a certain tract of land only, is binding on the user.

2. Mills' Ann. St., 2283, prohibits any person from running through his irrigating ditch more water than is absolutely necessary for irrigating his land and for domestic purposes.

Held that the contract gave the defendant only the right to the use of the company's ditch to conduct such volume of water as might be necessary for the purposes specified and no more.

(No. 3985.)

NEW LOVELAND AND GREELEY IRRIGATION AND LAND CO. VS. CONSOLIDATED HOME SUPPLY DITCH AND RESERVOIR CO.

Supreme Court, October 10, 1900.

In this case it is decided that a priority of appropriation for irrigation purposes does not carry with it a priority to the use of the winter waters for storage during the non-irrigating season.

Further, that the defendant's reservoirs being constructed and in operation long before the plaintiff's reservoir was commenced, the district court was clearly right in awarding to it priorities ahead of that of plaintiff.

Judgment affirmed.

(No. 4043.)

ABANDONMENT OF MILL PRIORITY—WHO TAKES.

CACHE LA POUDRE RESERVOIR CO. VS. WATER SUPPLY AND STORAGE CO. ET AL.

Supreme Court, September 17, 1900.

The appropriation of water by the milling company being prior to the appropriations of other companies for storage, upon the abandonment of use by the milling company the water thus restored to the river belongs to the appropriators below the point of discharge of the mill race into the river, in the order of their priorities, although they may be junior appropriators to others above the point of discharge.

CHANGING PLACE OF DIVERSION.

HANDY DITCH CO. VS. LOUDEN IRRIGATING CANAL COMPANY.

In this case, the right of an appropriator of water from a natural stream to change the point of diversion is held to be not an absolute right, but subject to the qualification that the rights of other appropriators must not be impaired, and more particularly the rights of subsequent appropriators.

"A subsequent appropriator has a vested right as against his senior, to insist upon the continuance of the conditions that existed at the time he made his appropriation."

CHAPTER IV.

REPORTS OF SUPERINTENDENTS OF IRRIGATION AND WATER COMMISSIONERS.

A perusal of the accompanying reports of the various superintendents reveals the fact that a substantial growth has been made since the last report, and also some improvement in the administration of the various districts. In general the various officers were wide awake and desirous of giving the best possible service. As the state advances in age the people of each district become better informed upon irrigation matters, and the men most peculiarly fitted for such work should be selected for the various positions. Considerable improvement has been made in the condition of the ditches in many parts of the state. Many new rating weirs and headgates have been constructed, but there is great need of further improvement in this direction, and we think water commissioners are justified in refusing to distribute water to such ditches as are not provided with the necessary measuring flumes and weirs.

The following reports are sufficiently full and need not be reviewed here. While, as we have said, we feel gratified in the main at the interest and enthusiasm manifested by the various officers in their work and a general desire on the part of all to do everything to promote the welfare of the various communities in which they work, yet we are somewhat disappointed at the information obtained concerning ditch, reservoir and crop statistics; perhaps this office is to blame somewhat for not sending out more explicit instructions to guide the commissioners. We think we realize the many difficulties under which they work, and are willing to excuse to a certain extent the apparent negligence. This matter of statistics has been discussed previously under the head of "Recommendations." The summary of crop reports, while perhaps there is a slight improvement upon former ones, is still very incomplete, and can in some of the divisions be considered only an approximation.

RECAPITULATION OF CROP REPORTS FOR 1899.

No. of Division	Ditches—Length thereof in miles	Average amount of water carried during season of 1899 in cubic feet per second of time	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage
1	2,525.25	6,016.00	837,954	163,410	49,828	127,880	14,738.50	356,485	15,097
2	1,959.40	4,964.43	516,578.50	127,287	3,583	49,816	17,021.25	86.177	1,630
3	761.50	2,481.20	485,421.50	9,777	1,741	86,880	50.50	160,814	----------
*4	----------	----------	----------	----------	----------	----------	----------	----------	----------
5	1,348	1,409	256,809.95	51,102	10,843	12,095	9,928.50	28,251	1,476
6	546	900	95,200	7,000	27,000	16,500	31	7,000	150
Totals	7,140.15	15,770.63	2,191,963.95	358,506	92,995	293,171	41,769.75	638,727	18,353

* No report.

RECAPITULATION OF CROP REPORTS FOR 1900.

No. of Division	Ditches—Length thereof in miles	Average amount of water carried during season of 1900 in cubic feet per second of time	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage
1	3,071.25	8,002.73	902,834	193,870	42,034	192,103	15,407.87	359,901	9,230
2	2,436.75	6,000	599,863	112,149	5,177	61,861	15,371.75	120,009	2,448
3	1,251.30	5,026.28	527,251.50	16,278.50	38,382	85,209.50	33	267,725	1,240
4	103	113.50	12,350	6,308	3,190	592	1,535.25	5,687	76
5	1,602	1,378	298,146	68,815	----------	22,117	10,410	36,073	----------
6	565	900	95,200	7,000	28,000	16,500	31	7,000	150
Totals	9,029.30	21,420.51	2,475,644.50	404,420.50	116,543	378,382.50	42,888.87	796,395	13,144

Denver, November 30, 1899.

HON. ADDISON J. McCUNE,
State Engineer, Denver, Colorado.

Dear Sir—I have the honor to submit to you my annual report as superintendent of irrigation for division No. 1. I received my appointment to this office April 30, 1899, and took possession of the office on the retirement of my predecessor, May 3.

On assuming the duties of the position I was confronted with a great demand for water for irrigation, while the supply was very limited; and although it was known that the supply of snow in the mountains was abundant, the unusual cold weather retarded the melting of it much later than was at all desirable for those needing water for early irrigation. But while the water was very short during the early part of the season, the supply during that portion of the time when it was most needed for irrigation was ample, and the melting of the snows was so gradual that the supply continued far later into the season than usual. The district commissioners without an exception report very successful and satisfactory results, crops of all kinds yielding an abundant harvest. From no district has there come a report of failure, or even a shortage of crop on account of lack of water.

The reservoirs in several of the districts perform a very important part in late irrigation; in fact, it is safe to say that the great potato crop of Northern Colorado is made by water stored early in the season in the large reservoirs located in Boulder, Larimer and Weld counties.

As to the tabulated reports of the several commissioners of the acreage of the different crops irrigated, and the cost of operating the ditches in their districts, I have to say that these reports, taken as a whole, are very incomplete and unsatisfactory, and unless a change is made in the conditions under which these statistics are collected, they will continue to be so; if they are of any value, certainly they should have some degree of accuracy. At present the commissioners are asked to do this work, and no provision is made for paying them; consequently in some of the districts the work is not half done, in others not at all, and where the reports are supposed to be complete they are no better than approximations.

I have tabulated reports from twelve districts, a summary of which shows a total length of ditches in the division of 2,525¼ miles, the daily average amount of water carried being 6,016 second feet, the number of acres that can be irrigated therefrom being 837,954.

The number of acres actually irrigated	727,438½
The number of acres of alfalfa irrigated	163,410
The number of acres of other seeded grasses irrigated	49,828
The number of acres of natural grasses irrigated	127,880
The number of acres of fruits irrigated	14,738
The number of acres of other crops irrigated	356,485½
The number of acres irrigated by seepage	15,097

At an actual expense for superintendence and repairs of $64,242.

The accompanying reports of commissioners will give you details of these matters.

I have found the commissioners of the several districts in the division efficient and ready at all times in the discharge of their duties, although they all report the need of more and better measuring devices, and ratings of the same. The only trouble that we have had was in district No. 4, where there have been so many transfers of water ordered by the former superintendent of irrigation that the decrees of priority rendered by referee's court are no longer a guide for the water commissioner in the discharge of his duties, thus making them much more difficult, and at the same time making it impossible for him to give satisfaction to the water users.

The commissioner of district No. 3 has been troubled with the same conditions, although not to so great an extent. It is hoped that an early appeal to the courts will be had, and so settle these matters to the satisfaction of all concerned.

In closing I wish to acknowledge the uniform courtesy and kindness received from yourself and all others connected with the department since my introduction to the office in an official position.

Respectfully submitted,

JAMES J. ARMSTRONG,
Superintendent of Irrigation, Division No. 1.

SUPERINTENDENT'S REPORT, A. D. 1899.

WATER DIVISION NO. 1—SOUTH PLATTE DIVISION.

No. of District	Ditches—Length thereof in miles	Average amount of water carried during season of 1899 in cubic feet per second of time	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage	Cost of superintendence	Cost of repairs for year
1	182.25	480	77,995	17,119	40	16,566	235	36,010	150	$ 2,575 00	$ 8,340 00
2	225	916	19,837	16,157	188	6,948	198.50	28,515	1,680	2 ,308 00	4,135 00
3	390	1,315.50	201,200	48,725	----------	8,983	1,459	111,964	1,280	12,506 00	9,463 00
4	203	331	----------	6,300	----------	----------	275	10,946	----------	----------	----------
5	251	619	91,455	7,825	3,075	20,035	1,535	60,410	----------	----------	----------
6	379	459	83.901	17.924	3.853	11,100	1,988	41,052	1,330	3,445 00	3,505 00
7	239	599	138,272	36,245	27,673	4,693	6,919	49,750	5,513	----------	----------
8	121	210	34,774	1,124	2,325	30	1,815	6,655	----------	----------	3,000 00
9	58.50	77.50	5,875	2,027	443	400	91	2,284	994	1,220 00	1,817 00
Reservoirs in 9	----------	----------	7,535	2,721	461	325	126	2,903	3,700	----------	----------
23	117	776	27,500	----------	400	8,309	----------	----------	----------	----------	----------
*46	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
47	191	415	52,610	----------	1,360	27,587	----------	99.50	----------	----------	----------
*48	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------

64	161.50	519	97,000	7,243	10	22,905	54	5,897	380	$ 2,395 00	$ 9,535 00
*65											
Totals	2,525.25	6,016	837,954	163,410	49,828	127,880	14,738.50	356,485.50	15,097	$24,447 00	$39,795 00

* No report.

Denver, Colorado, December 17, 1900.

HON. ADDISON J. McCUNE,
State Engineer, Denver, Colorado.

Dear Sir—In submitting this, my annual report for the year nineteen hundred (1900), I have to say that the commencement of the season was very different from that of last year, in that we were favored with an abundant supply of water very early in the season. Before the first of May all of the large storage reservoirs in the division were filled, and, the canals not having use for the water, there was necessarily a great quantity of water running out of all the disrticts in the division; at a fair estimate there was not less than 10,000 cubic feet per second going to waste during the first two months of this last season. The damage to bridges, their approaches and the roads in the districts, strongly emphasizes the necessity for the construction of large reservoir systems for the detention and saving, for beneficial use, of this vast amount of water.

During the rest of the season the supply of water for irrigation, while not quite equal to last year's, was, by careful management, sufficient for the needs of those requiring it, and the commissioners report no loss of crops from scarcity.

I desire to give credit to the several district commissioners for their unremitting exertions to give satisfaction to the water users. Accompanying this report you will find the written and also the tabulated reports from the several district commissioners. As to the corrctness and the manner of collecting the statistics contained therein, I can only repeat what I said in last year's report, viz.: That if they are of any value to the public some provision should be made for paying the commissioners for doing the work. Under existing conditions the reports are no better than approximations. The constantly increasing importance of the irrigation interests of the state call for more full and accurate statistics in regard to the water supply and the distribution in all our water districts, and also the amount of land irrigated, with the acreage devoted to the different crops raised thereon, so that a more correct knowledge may be had of the highest duty of water attainable. It is to be regretted that some of the boards of county commissioners in this division in their laudable desire for economy should feel obliged to cut down the time of the water commissioners to the lowest number of days possible in the discharge of their duties, as on them devolves the duty of gathering and compiling these statistics. I have received tabulated reports from fourteen districts, a summary of which shows a total length of ditches in this division of 3,071.25 miles, the daily average of water carried being 8,002.73 cubic feet per second, and the highest number of days water was carried in any district being 365.

The number of acres that can be irrigated	902,834
The number of acres actually irrigated	803,315
The number of acres of alfalfa irrigated	193,870
The number of acres of other seeded grasses irrigated	42,034
The number of acres of natural grasses irrigated	192,103
The number of acres of fruits irrigated	15,407
The number of acres of other crops irrigated	359,901
The number of acres irrigated by seepage	9,230

At an estimated expense for superintendence and repairs of $111,349.75. The accompanying reports of district commissioners will give you details of these matters.

In your communication to me dated September 25, 1900, you make inquiry as to what extent the exchanging, or loaning, of water, under section 3 of senate bill No. 429, Twelfth General Assembly, was practiced in this division.

In answer I have to say that there have been but few applications made under this section, and in every case they were for a loan of water for practically the entire irrigation season, from canals or ditches having early priorities to others having very late or junior appropriations, which would clearly be an infringement on the rights of intermediate appropriators. Applications were denied on the ground that the law was not applicable to such cases. After consultation with certain senators, who were said to be responsible for the introduction of section 3 of this act, I am satisfied that it was never intended to apply to the distribution of water from the rivers or streams, but rather to legalize a practice already in operation under a number of large irrigation systems where the water is distributed pro rata, as provided by statute, section 4, page 97, acts 1879. The right to make this exchange had been denied by some corporations. While the words "exchange with" or "loan to" used in the section mean the same thing, the terms are misleading unless carefully considered in their connection with the whole reading of the section, and I would recommend that this section be amended by striking out the words "loan to" wherever they occur.

Session Laws, 1880, page 161, section 1, provides that all ditch owners shall erect and maintain headgates in connection therewith. Session Laws 1881, page 121, section 12, provides that the owners of any ditch, canal or reservoir shall construct and maintain a measuring weir or other device for the more accurate and convenient measurement of water appropriated.

Session Laws 1897, page 176, section 2, provides that any person or company transferring water from one public stream to another shall construct and maintain measuring flumes or weirs and self-registering devices at the point where it leaves its natural watershed and is turned into another, and also at the point where it is finally diverted for use from the public stream.

Section 4 of the same act makes the same provision for the exchange of water from reservoirs to ditches.

As none of these laws have any penalty attached for non-compliance, they have been very generally disregarded and I would respectfully suggest that the coming session of the legislature amend these laws, so as to make it the duty of the water commissioner to refuse to deliver the water until the provisions of the laws are complied with.

The law provides that there shall be kept on file in the office of the superintendent of irrigation certified copies of decrees of all appropriations of water by the ditches in the several districts in his division.

On taking charge of the business of this office it was found that the law governing this matter had not been complied with, there not being complete filings for any district, and for the majority of the districts there were none at all.

Under your instructions I entered into correspondence with and visited the several boards of county commissioners in the districts interested, and placed the matter before them for consideration. It gives me pleasure to say that, with their co-operation, and the assistance of the clerks of the District Courts of these districts, this office has now on file complete lists of certified copies of decrees of appropriations for each and all of the water districts in this division, with the exception of district No. 65, in which there has never been a referee's court held for the adjudication of claims. I should like to suggest to the water users in this district, that the longer the sitting of a referee's court is delayed, the more expensive it will be, and the more difficult it will become to procure testimony to prove their priorities. It is quite important to all parties interested that the matter should be attended to, as there are now on file from district No. 65 fifty-three claims for ditch and reservoir appropriations.

In closing, I wish to thank each and all of the water commissioners of this division for their prompt and efficient assistance in carrying out instructions from this office; and I desire to express my thanks to you, and to all my associates in the department, for the unvarying courtesy and kindness which I have received from each while in this office.

Yours very respectfully,

JAMES J. ARMSTRONG,
Superintendent of Irrigation, Division No. 1.

SUPERINTENDENT'S REPORT, A. D. 1900.

WATER DIVISION NO. 1—SOUTH PLATTE DIVISION.

No. of District	Ditches—Length thereof in miles	Number of days water was carried therein	Average amount of water carried during season of 1900 in cubic feet per second of time	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage	Cost of superintendence	Cost of repairs for year
1......	310	200	1,113	159,650	33,708	100	38,552	349	71,905	....	$ 5,025 00	$25,045 00
2......	244	210	805.90	38,182	17,899	198	6,470	205.37	18,329	1,942	3,660 00	9,350 00
3	395.50	365	1,200.50	186,355	51,920	610	9,473	1,913	100,034	1,400	13,338 00	23,821 00
4......	228	168	528	....	....	....	....	....	....	....	....	....
5......	264	260	497	91,695	7,825	3,075	20,035	1,535	61,160	....	1,753 71	3,239 14
6......	376	200	539	87,291	17,035	4,523	9 546	2,337	41,458	1,295	2,730 00	5,340 00
7......	246.50	173	532.25	135,321	36,255	27,633	4,683	6,932	49,755	3,577	9,450 00	2,100 00
8......	131	195	396	33,900	5,392	2,858	136	1,840	6,359	....	2,373 00	5,000 00
9......	61.50	139	120.08	14,005	6,850	872	357	223	5,202	786.50	1,620 00	705 00
23......	117.75	75	692	....	....	250	23,720	....	....	....	....	....
46......	344.75	50	548.50	37,370	....	670	36,700	....	....	....	....	....
47......	151.50	90	250	38,075	....	1,235	22,990	....	65	....	....	....
48......	35.75	96	221.50	4,110	....	....	3,710	....	....	....	470 00	680 00

64	165	240	559	79,900	16,986	10	20,731	73.50	5,934	230	2,695 00	12,955 00
*65	------------	------	------------	------------	------------	------------	------------	------------	------------	------------	------------	------------
Totals	3,071.25	------	8,002.73	902,834	193,870	42,034	192,103	15,407.87	359,901	9,230	$23,114 71	$88,235 14

* No report

Pueblo, Colo., February 21, 1900.

HON. A. J. McCUNE,
Denver, Colo.:

Dear Sir—I have the pleasure to present the enclosed, my annual report for the year ending December 31, 1899:

The season opened short of water, nothwithstanding the continued reports of deep snows in the mountains; the ground having been frozen unusually deep, left it spongy and dry to a greater depth than ever known before, thereby requiring three times the amount of water, and often five times as much, to do the work of former years; coupled with this fact we had no water at all until May 12, then the river began to rise, and on the 15th we had the usual discharge that supplied the entire valley, but owing to above reasons, this amount was totally insufficient, until the 29th, we had then abundance for the demand. Throughout the entire division the entire first crops were short, fruits almost a total failure. Our supply of water continued until July 20, reaching its highest point June 20; at that time there were 4,560 cubic feet per second of time at our gauge. August 18 it fell as low as 136 cubic feet at same point, and varied from that to about 300 cubic feet, becoming a steady flow. The entire division was greatly distressed for water, and in some places continued so, both for stock and irrigating purposes.

When the warm weather came the snows melted very rapidly. There was no reservoir water during the summer period.

Almost all the ditches and canals in this division are supplied with good headgates, rating flumes, waste gates.

The acerage in all crops has increased very materially in the last year.

In the Arkansas valley over one hundred and forty thousand head of sheep are being fed for the eastern mutton markets; also large herds of cattle are fed in this valley.

The experiments in winter irrigation have resulted in great demand for water during the winter months, so much so that the streams are totally exhausted thereby.

The sugar beet interest in this Arkansas valley has grown to such proportions that there are already under construction two immense sugar plants, one at Rocky Ford and one at Sugar City, on the Missouri Pacific Railway, near Ordway. Thousands of acres of beets have been contracted for by these plants. The one result will be large colonies of immigrants in the valley, to say nothing of the profits to consumer and producer of this great industry.

To the following summary I respectfully call your attention; the same is approximately correct: We have in this division 1,859 miles of ditches; there are nearly 600,000 acres available for irrigation; of this about 130,000 acres are in alfalfa; in other crops of all kinds about 170,000 acres.

Respectfully,

E. R. CHEW.

SUPERINTENDENT'S REPORT, A. D. 1899.

WATER DIVISION NO. 2—ARKANSAS DIVISION.

No. of District	Ditches—Length thereof in miles	Average amount of water carried during season of 1899 in second-feet	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage	Cost of superintendence	Cost of repairs for year
10	85.79	161	20.350	1,855	160	1,680	56	793	----	----	----
*11	----	----	----	----	----	----	----	----	----	----	----
12	176.25	193.80	13,191	4,144	1,154	1,556	4,770	77	----	----	$1,442 00
13	76.75	165.13	4.828	502	524	2,703	1,143	416	----	----	16,300 00
14	316.75	764.36	131,427	34.314	468	11,828	4,891	22,118	1,335	$48,913 00	28,754 00
15	180.75	122.30	10,458.50	3,137	561	1,561	242.25	2,375	----	520 00	2,265 00
16	220.25	284.04	15,850	3,264	275	1,122	65	3 696	----	----	1.278 75
17	351.50	1,751	142,324	51,190	161	4,140	2,604	34,387	----	9,127 00	16,228 00
*18	----	----	----	----	----	----	----	----	----	----	----
19	200	207.80	39,105	7.175	280	2.496	293	5,600	295	575 00	9,277 00
67	251	415	139,045	21,660	----	22,720	2,957	16,715	----	3,975 00	13,100 00
*49	----	----	----	----	----	----	----	----	----	----	----
*66	----	----	----	----	----	----	----	----	----	----	----
Total	1,859.04	4,964.43	516,578.50	127,287	3,583	49,816	17,021.25	86,177	1,630	$63,110 00	$88,644 75

* No report.

Pueblo, Colo., December 1, 1900.

HON. A. J. McCUNE,
State Engineer, Denver, Colo.:

Sir—I have the honor, as superintendent of irrigation of water district No. 2, known also as the "Arkansas division," to submit the following report for the year 1900, together with the reports of the water commissioners of this division received by me.

The water division, under my superintendence, is defined as follows:

"That the water districts now or hereafter to be formed, consisting of lands irrigated by water taken from the Arkansas river, the South Fork of the Republican river, the Smoky Hill river and the Dry Cimarron river, and the streams draining into the said rivers, shall constitute water division No. 2, and be named the Arkansas division."

That portion of the drainage basin of the Arkansas river which includes water division No. 2 is in the shape of an irregular triangle, with the base upon the eastern line of the state and the apex in the vicinity of Leadville.

The area embraced within this triangle is nearly twenty millions of acres, which is several millions of acres more than one-fourth of the area of Colorado. This is the most important irrigation division of Colorado. It embraces thirteen water districts. These water districts are numbered 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 49, 66 and 67. It includes in whole or in part twenty counties; twelve of these counties, namely, Lake, Chaffee, Fremont, Pueblo, Otero, Bent, Prowers, El Paso, Teller, Huerfano, Las Animas and Custer, are irrigated in part from the Arkansas river, or its tributaries; the eight other counties, namely, Park, Kiowa, Baca, Lincoln, Arapahoe, Cheyenne, Kit Carson and Elbert, while located wholly or in part within the drainage basin of the Arkansas river, have no lands irrigated from that river or its tributaries.

The Arkansas division is a very rich division. It contains not only great coal beds, oil fields, iron deposits and precious mineral belts, but embraces a vast stretch of unsurpassed stock ranges and feeding grounds and more than one-half a million of acres located under ditches and capable of being irrigated therefrom, which are adapted to farming, gardening, fruit raising and are especially adapted to the growing of sugar beets. The writer, in his report of December, 1898, in an article on sugar beets, disclosed the adaptability of the lands and climate of the Arkansas valley to the successful culture of the sugar beet, and prophesied that in the very near future large factories would be established in this division. No one, however, is more surprised than the author at the rapidity with which his prophesies are being fulfilled. Two large factories for the manufacture of sugar from the sugar beet have been erected in the valley within the last year, one at Rocky Ford, in Otero county, built by the American Beet Sugar Company, and the other at Sugar City, in the same county, built by the National Beet Sugar Company. Reference to these companies and their works cannot be out of place in this report, for they are intimately connected with the future agricultural and industrial developments of this division.

The National Beet Sugar Company is organized under the laws of this state. It is capitalized for $1,500,000.00. This company owns 12,000 acres of land and a one-half interest in the townsite of Sugar City, consisting of 320 acres, located adjacent to the factory. The capacity of the factory of this company is 500 tons of beets daily, and the factory, consisting of massive brick and steel main buildings, boiler houses, machine shops, lime houses, office buildings, laboratories, beet sheds and coke houses, has cost $600,000.00.

The number of men employed in its various departments is about 300; the number of men employed by the company during the construction of its plant and its operations in beet fields during the season just passed has been 1,200.

It is the intention of the company to cultivate within the next few years its 12,000 acres of land adjacent to the factory, a portion of which will be devoted to beet culture and the balance to other crops, which will be rotated from year to year with the beet crops.

Notwithstanding that much of the 2,500 acres planted in beets during the year just past has been upon new land, the quality of the beets has been a great surprise, the average per cent. of sugar being over 18 per cent. and the average coefficient of purity being 86 per cent. The tonage on the new land is less than on old land, the average on old land being from 14 to 18 tons per acre. Some of the farmers, whose lands were in excellant condition, have raised during the year past as high as 32 tons to the acre, and one particular farmer, who had 50 acres of beets, I am informed by the company, will this year be paid over $4,000.00 for his crop.

The factory of the American Beet Sugar Company is located at Rocky Ford. The factory was commenced and completed this year at a cost of about one million dollars. This company is incorporated under the laws of New Jersey. Its capitalization is twenty millions of dollars. Its president, Henry T. Oxnard, has devoted many years to the fostering of the culture of the sugar beet in the United States and the manufacture of sugar therefrom. This company owns about 5,600 acres of land. The capacity of its factory is 1,000 tons of beets in twenty-four hours. It is now running at the rate of 800 tons of beets in twenty-four hours. The area cultivated for this factory this year was about 4,000 acres. Comparatively few people in the valley were willing in the early part of the year to enter into contract with the American Beet Sugar Company for the raising of beets. The success of the beet growers during the present season has been such as to induce many to apply for contracts under which they will raise and sell beets to the factory during the coming year, and it is expected that eight or ten thousand acres will be planted to beets for this company during the year 1901. The average tonage of beets this year has not been very large. It will not greatly exceed ten tons to the acre. This has been because much of the land which has been put to beets has been new land and it is partly because of the inexperience of the farmers and their tendency to look at the whole subject in the light of an experiment. Many of the fields, however, upon which the beets were raised to supply this factory have yielded eighteen to twenty-five tons to the acre. The highest tonage so far reported has been twenty-nine tons to the acre. The per centage of sugar in the beets raised upon this land raising twenty-nine tons to the acre was 18.5, and the value per acre of the beets raised upon this tract was about $150.00. The officers of the factory pronounce the beets to be of the finest quality, averaging between seventeen and eighteen per cent. sugar and having coefficients of purity between eighty-three to eighty-four per cent. Officers of the American Beet Sugar Company and of the National Beet Sugar Company have expressed themselves as more than pleased with the results of the past year's efforts in the Arkansas valley, and it is freely prophesied by students of beet culture that the Arkansas valley in Colorado will be the great sugar producing district of the United States. The effect of the building of these sugar factories has not been simply to increase the population of the valley immediately adjacent to the factories. They have done far more than to double the population at Rocky Ford, and build within a year the town of Sugar City, with its population of more than a thousand people. The effect of these factories extends up the Arkansas river to Pueblo, and down the river to the state line. These factories may draw their supply of beets from this entire area, and the railroad companies of the valley, realizing the advantages to the valley brought by such improvements, have made such rates for transportation that beets may be profitably raised and shipped to these factories by rail from all points of the valley having railroad connections. Beet culture means a dense population, and around each nucleus of beet raisers small towns spring up and new industries develop. Beet raising in the valley has stimulated the growth of many towns in the district, including besides Rocky Ford and Sugar City, at which the factories are located,. the towns of La Junta, Las Animas, Lamar and Holly, to the east of the factory, and the towns of Ordway, Olney, Manzanola, Fowler, Nepesta, Avondale and Pueblo to the west of the factories.

It is very fortunate in connection with the development of this industry in the Arkansas valley that the relations between the growers of beets and the managers of the factories have been so satisfactory. There is no instance known in which complaint has been entered by the beet growers against the analyses of beets made by the factories.

These references to the industry of beet raising have been made, not only because they are of general interest and disclose the progress of the valley, but because they involve special work on the part of the officers of the state intrusted with the distribution of the waters of the valley. These officers are interested, as should be every citizen of the valley, in the successful growing and maturing of each beet field within the water districts of this division, and while it is fortunate that beets do not demand late water, the irrigation of such fields being usually completed by the first of August, yet it is true that during July a great effort is needed to furnish to all portions of the valley water for the last irrigation of these beet crops. In this connection I desire to express satisfaction with section 3, of an act in relation to irrigation, approved April 6, 1899, which provides for the temporary loan or exchange of water.

Under this section water was exchanged between ditches in a number of water districts of the valley. Such exchanges were always beneficial. The different ditch owners of the valley wisely realized the advantages of such exchanges, and undoubtedly by reason of exchanges of water crops were saved which could not otherwise have been saved, for without the provisions of the section quoted the superintendent of the division and his commissioners would have been obliged to distribute water strictly in accordance with the decrees governing the priorities of rights to water. While at first there was some opposition to the section quoted, permitting the exchanges of water between different ditches, the opposition is dying out and the majority of the ditch owners in the Arkansas valley now look with favor upon this new law.

The importance of a water supply cannot, of course, be overestimated. The entire valley is, of course, interested in seeing the lands cultivated to beets successfully watered. Fortunately the beet sugar companies have realized the importance of securing satisfactory water rights and privileges. The American Beet Sugar Company has secured water rights in the Rocky Ford canal, the oldest in district No. 17, and has an abundant supply of water at all times. The National Beet Sugar Company derives its supply of water through the Colorado canal, supplemented by the Twin Lakes reservoir and Lake Henry. The Twin Lakes reservoir site has long been regarded as the best reservoir site in the Arkansas valley. The Twin Lakes cover about 2,000 acres and sixteen feet in depth over this area is available for use by this company. Lake Henry is only about four miles from the factory, is six miles in circumference, covers about three square miles, from which water can be drawn to a depth of five feet and applied to the beet lands of the National Beet Sugar Company. Undoubtedly additional factories will be constructed in the valley, and while it is not always easy to secure as good water rights as those secured by the factories above described, yet under the section quoted from the laws of 1899, it will be possible to provide water for the nourishment and maturing of beets for additional factories wherever they may be located in the Arkansas basin.

The new beet industry has stimulated other industries, with the exception, perhaps, of the melon industry, and has not seriously encroached upon that, although the acreage in melons during the last year was not as large as in 1898 and 1899, yet the returns from the crop, an unusually excellent one, both in flavor and shipping qualities, were about the same as in previous years.

The industry of feeding sheep and cattle is stimulated by beet culture, for the pulp of the beet retains all of the starch originally in the beet, and this, fed with hay, makes an excellent fattening food. So excellent for feed is the beet pulp that the output of both factories has been contracted for by feeders of sheep and cattle, including Colonel Lockhardt and other well-known feeders of the West.

Approximately stated, we have in this division a total area of about 600,000 acres of land which is, or can be, easily irrigated by means of ditches already constructed. Of this area there is about 120,000 acres in alfalfa. Estimating the alfalfa crop at a fair average of five tons per acre, gives a total tonage of 600,000 tons, and this at a valuation of $3.00 per ton in the stack, gives th enormous sum of $1,800,000. There has recently sprung up a market for Arkansas valley alfalfa in St. Louis and Kansas City, and owing to the reasonable rates made by the railroads, alfalfa shipped to these cities is yielding the farmers of the district $6.00 per ton net. In addition to this large alfalfa area, there is about 120,000 acres of land planted to grain crops. I have not sufficient data at hand to enable me to give the value of these products, but it is very large.

The Arkansas valley is becoming year by year more and more of a feeding valley for sheep. These sheep are brought from Idaho, Wyoming, California, Arizona, New Mexico and Utah. They are brought into the valley for winter feeding, not only because of the abundance of alfalfa raised in the valley, but because of the fine winters and transportation facilities. These sheep, when fattened, are cheaply and readily shipped to Chicago, Kansas City, St. Joseph, St. Louis, Omaha and other Missouri river points. The number of cattle and sheep fed in the valley is not known accurately, but it is believed that not less than 150,000 head of cattle are grazed and fed in the valley and not less than 240,000 head of sheep are fattened for market.

The quality of the fruits in the Arkansas valley is excellent. The quantity of fruits raised in the valley is increasing somewhat, principally around Canon City and Florence, in Fremont county and in Otero county. Canon City and Florence continue to ship apples and small fruits by the carloads. The fruits of the Arkansas valley continue to show those excellent keeping qualities which have been noted in the past, and by reason of which the fruits of the Arkansas valley have been successfully shipped to London, Paris and other European points.

The canning business of the valley has also shown a gratifying increase, and this year's product at the several canning factories is extremely large. These factories are located at Pueblo, Canon City, Rocky Ford and La Junta. They are doing a general pickling and canning business, using every kind of fruit and vegetable grown in the valley.

I have experienced great difficulty in gathering statistics. Many stockmen and producers of farm products refuse to give the facts asked for and seem to be afraid that the collection of statistics, which the irrigation department of the state is making, may in some way work to their disadvantage.

I would add a few words in regard to winter irrigation. The farmers of the valley are using most all of the available supply of water in the river for winter irrigation. This is evidenced by the drainage from the river. The lands irrigated in the winter, it is found, produce largely in excess of lands not so irrigated.

I wish to repeat a section of my biennial report of 1898, namely:

"The authority of water commissioners is often questioned, and the denial of their authority frequently leads to serious trouble. To correct this difficulty I would recommend that all water commissioners, while on duty, be required to wear some badge of authority to be defined by statute and that severe penalties be provided for the punishment of those who unlawfully interfere with the water commissioners in the proper exercise of their official duties."

Again I wish to add also that the superintendent should be paid directly by the state, thereby saving the different county officers much uncertainty and annoyance in providing for the payment of his per diem charges and expenses.

In regard to the power of the water superintendent, it is very insufficient. In the many controversies which necessarily arise, especially in times when water is scarce and in great demand, the superintendent, who is conversant with the whole irrigation system of his division, should be clothed with full power to settle, temporarily, at least, all controversies and disputes relating to the immediate distrubution of water, and should be given lawful authority to compel, in a summary way, obedience to his decisions when made, at least so far as questions relating to the distribution of water are concerned.

The headgate keepers especially should be compelled to regard the directions of the superintendent. At the next session of the legislature this should be taken up and greater authority should be given over headgate keepers. I earnestly suggest that you call the attention of the legislature to this subject.

You will observe a great difference in the figures of district No. 16, as reported by Commissioner Griffin in 1898, and in Commissioner Dempsey's report. The apparent discrepancy is due to the readjudication of water rights in this district, as ordered by the court in June, 1897, in which not more than one-half the ditches reported by Commissioner Griffin participated, therefore these ditches not having an official decree, were omitted by Commissioner Dempsey in his report.

I wish to thank the water commissioners in the various districts for their universal courtesy and faithful assistance. There has been good feeling and co-operation throughout the year.

The officers who have been on duty for the past year are as follows:

District No. 10—T. B. Pyles, Colorado Springs.
District No. 11—D. M. Jones, Buena Vista.
District No. 12—T. H. Newkirk, Florence.
District No. 13—Louis Mueller, West Cliffe.
District No. 14—T. J. Burrows, Pueblo.
District No. 15—C. E. Emery, Pueblo.
District No. 16—J. K. Dempsey, Walsenburg.
District No. 17—J. B. Bowman, Manzanola.
*District No. 18— —— ———
District No. 19—Felix Cordova, Trinidad.
*District No. 49— —— ———
*District No. 66— —— ———
District No. 67—J. B. Traxler, Lamar.

Wishing for the water districts within which my duties have been performed, continued prosperity, and acknowledging with highest appreciation the numerous courtesies received from your office, I respectfully submit this, my annual report.

E. R. CHEW,
Superintendent Division No. 2.

SUPERINTENDENT'S REPORT, A. D. 1900.

WATER DIVISION NO. 2—ARKANSAS DIVISION.

No. of District	Ditches—Length thereof in miles	Average amount of water carried during season of 1900 in second-feet	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage	Cost of superintendence	Cost of repairs for year
10	110.50		36.300	4,558	531	4,486	317	2,418	20		$ 1,784 60
11	259.25		24,965	3,018	1,588	2,127	105	6,818	301		472 00
12	348.25		13,798	4,533	354	1,566	3,489	6,072	172	$ 1,630 00	4,574 50
13	155		17,044	550	1,300	9,025	127	1,348	280		427 00
14	313.50		144,165	36,880	130	7,737	5,054	30,676	1,350	10,641 00	42,293 56
15	190.50		11,280	3,480	573	1,685	242.25	2,430	60	800 00	2,855 00
16	220.25		15,851	3,581	275	1,022	65	3,739	40		366 00
17	351.50		156,810	22,800	30	9,865	2,640	39,895	120	4,550 00	9,231 00
*18											
19	237		40,605	9,339	279	2,728	235.50	8,913	105	570 00	11,405 00
*49											
*66											
67	251		139,045	23,410	117	21,620	2,997	17,700		5,900 00	9,275 00
Totals	2,436.75		599,863	112,149	5,177	61,861	15,371.75	120,009	2,448	$24,091 71	$82,673 66

* No report.

Monte Vista, Colorado, December 20, 1899.

MR. ADDISON J. McCUNE,
Denver, Colorado:

My Dear Sir—I have the honor to submit the following report of water division No. 3 for the season of 1899:

Water division No. 3 includes all the water districts watered from the Rio Grande river and its tributaries. The division embraces water districts Nos. 20, 21, 22, 24, 25, 26, 27 and 35, in the counties of Conejos, Costilla, Rio Grande, Saguache and Mineral.

Water district No. 20, Lon Mitchell, commissioner, Alamosa, Colorado:

This is the largest district in division No. 3, including all the land irrigated from the headwaters of the Rio Grande river to the mouth of the Conejos, also Rock creek and San Francisco creek and Meyers creek. It is from the Rio Grande river that all the large and principal canals of the famous San Luis valley get their supply of water.

The lands in this district are mostly sub-irrigating, which makes a great saving of water as compared with lands which must be flooded. There are hundreds of artesian wells in the district, which help in a measure to hold the sub-irrigation up after its having been brought up by the ditches.

A great deal of credit is due Mr. Lon Mitchell for the able way in which he has handled this district. While the water supply was very short this season, there were some very good crops raised. We had some very good rains, which helped out a great deal.

District No. 21, David Martinez, commissioner, Capulin, Colorado:

This district includes all lands irrigated from ditches or canals taking water from the Alamosa and La Jara creeks and their tributaries. This district is better adapted for raising alfalfa and different grasses than for raising grain. Mr. Martinez reports having plenty of water in the early part of the season, but none to speak of late in the season.

District No. 22, Jno. C. Daulton, commissioner, Manassa, Colorado:

District No. 22 consists of all lands irrigated from the Conejos river and its tributaries. Mr. Daulton has had a very good head of water the most of the season, with the exception of the last month or six weeks of the irrigating season.

District No. 24, L. D. Valdez, commissioner, San Luis, Colorado:

Mr. Valdez reports plenty of water in his district, so has very little trouble in supplying the wants of his people.

District No. 25, Gus Peterson, commissioner, Mirage, Colorado:

There is not a great deal of grain raised in this district at present, but the people are raising more and more every year. Mr. Peterson reports a great deal of trouble with his water consumers this year.

District No. 26, C. A. Potts, commissioner, Saguache, Colorado:

This district consists of all lands irrigated from Saguache creek and its tributaries.

District No. 26 is adapted more especially to wild hay and alfalfa. In certain parts of the district there is considerable grain raised, such as wheat, oats, barley and peas; also some very fine potatoes.

A great deal of credit is due Mr. Potts for the able manner in which he handled his district during the past year.

District No. 27, Arthur Scott, commissioner, Pruden, Colorado:

District No. 27 consists of all lands watered by the La Garita and Canero creeks. This is mostly a hay country. Mr. Scott has had very little trouble in his district this year.

District No. 35 has had no water adjudicated, hence we have no water commissioner in this district, and we have had no occasion to visit it.

I have qualified as superintendent of irrigation of this district of the water divisions of the state, and received from my predecessor the books and records of the office on May 17, 1899. I was immediately called into service by the water consumers of my division and have answered all calls up to the present time. The water supply was the shortest this season of any season for the last twenty years.

Believe me, sincerely yours,

(Signed) J. FRANK GOAD,
Superintendent of Irrigation, Division No. 3.

SUPERINTENDENT'S REPORT, A. D. 1899.

WATER DIVISION NO. 3—RIO GRANDE DIVISION.

No. of District	Ditches—Length thereof in miles	Average amount of water carried during season of 1899 in second-feet	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage	Cost of superintendence	Cost of repairs for year
20	469	2,163	426,080	8,280	....	39,450	....	152,814	....	....	$ 395 00
*21	....	....	....	....	....	....	....	....	....	....	....
*22	....	....	....	....	....	....	....	....	....	....	....
*23	....	....	....	....	....	....	....	....	....	....	....
24	46.25	115	10.538	323	....	2,020	....	8,294	....	$ 708 00	714 00
25	237.55	125.80	44.998.50	367	41.50	43,185.50	....	997	....	....	....
26	8.25	77.40	3,805	807	....	1,425	....	1,523	....	....	....
*27	....	....	....	....	....	....	....	....	....	....	....
*35	....	....	....	....	....	....	....	....	....	....	....
Totals	761.05	2,481.20	485,421.50	9,777	41.50	86,080.50	....	163,628	....	$ 708 00	$1,109 00

* No report.

Monte Vista, Colorado, November 24, 1900.

MR. ADDISON J. McCUNE,
State Engineer, Denver, Colorado:

My Dear Sir—I have the honor to submit herewith the reports of the water commissioners, together with my report, for the year 1900.

In this division there were seven of the eight districts having water commissioners in active service during the irrigating season. All of the important ditches in this division have measuring flumes, which help the water commissioners a great deal in the measurement of water. When I took charge of this division there were but three measuring flumes in the whole division.

The water supply for the past season has been very good. There was more grain raised this year than in any one year since the division was created.

The water storage question is one of great importance to this division. There are but three small reservoirs in the division, but there could be many large ones built at a nominal cost if the state would take hold and build them.

Extensive improvements have been made in ditches in this district during the present season.

Water district No. 20 has seven hundred and ten miles of ditches. This is the largest district in water division No. 3.

Water district No. 21 has one hundred and seventy-seven miles of ditches and carried five hundred and seventeen feet per second of time.

Water district No. 22 has not made any report this year.

Water district No. 24 has only forty-eight miles of ditch, but that forty-eight miles covers more territory accordingly than any other district in water division No. 3.

Water district No. 25 has two hundred and thirty-five miles of ditches. This is next to the largest district in water division No. 3. It has more ditches than district No. 20, but they are not nearly so long nor so large as in district No. 20.

District No. 25 is a district that it is very hard to handle, as it has so many little ditches to look after.

Water district No. 26 has one hundred and seventy-five miles of ditches. This is a very difficult district to handle, as there is at no time water enough to fill the priorities, more water having been decreed than the creek can carry.

Water district No. 27 has between fifty and sixty miles of ditches, and covers a great deal of territory, as it is a grass and hay country and a great many cattle are raised. There was plenty of water in this district until the latter part of the season, when the creeks nearly went dry. This is a very hard district to keep headgates in, as in the spring of the year, when it begins to thaw out, the ground gives way and the headgates wash out, so there are not a great many headgates on the streams in this district.

Water district No. 35 has no water commissioner, there never having been any water adjudicated to this district.

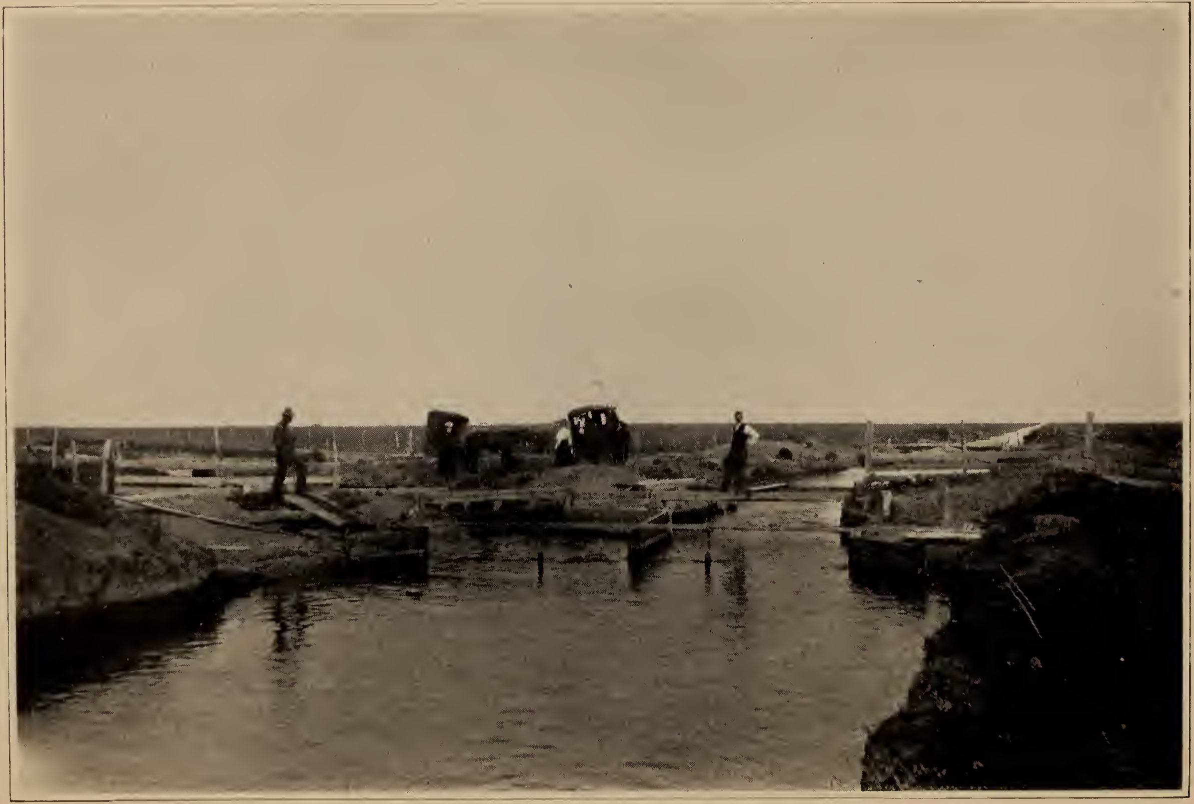
It affords me great pleasure to say that each and every one of these commissioners has performed his duties in as fair and impartial a manner as he could, considering the shortage of water at different times during the past two seasons. The season of 1899 was a very trying one on the commissioners as well as myself, there being at no time in any of the districts water enough to supply the priorities.

In conclusion, I wish to thank these gentlemen for the prompt compliance with which they met my every request, and for the excellent judgment manifested in the performance of the difficult and arduous duties which devolved upon them.

Believe me, sincerely yours,

J. FRANK GOAD,
Superintendent of Irrigation, Division No. 3.

State Engineer,
Denver, Colo.



DIVISION GATES, FARMERS' UNION CANAL NEAR CENTERVIEW, SAN LUIS VALLEY.

SUPERINTENDENT'S REPORT, A. D. 1900.

WATER DIVISION NO. 3—RIO GRANDE DIVISION.

No. of District	Ditches—Length thereof in miles	Average amount of water carried during season of 1900 in cubic feet per second of time	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated there from	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage	Cost of superintendence	Cost of repairs for year
20	628.50	3,110.80	389,140	10,115	37,095	----	25	162,415	----	----	$4,455 00
21	177	517	60,710	2,458	1,105	19,707.50	----	34,423	1,240	----	----
*22	----	----	----	----	----	----	----	----	----	----	----
*23	----	----	----	----	----	----	----	----	----	----	----
24	46.25	115.85	10,538	479.50	----	2,020	----	8,041.50	----	$ 420 00	714 00
25	237.55	907.63	45,381.50	359	17	44,599	8	1,114.50	----	----	----
26	162	375	21,482	2,867	125	18,883	----	1,731	----	----	----
*27	----	----	----	----	----	----	----	----	----	----	----
35	----	----	----	----	----	----	----	----	----	----	----
Totals	1,251.30	5,026.28	527,251.50	16,278.50	38,342	85,209.50	33	267,725	$ 1,240	$ 420 00	$5,169 00

* No report.

SUPERINTENDENT'S REPORT, A. D. 1900.

WATER DIVISION NO. 4—SAN JUAN DIVISION.

No. of District	Ditches—Length thereof in miles	Average amount of water carried during season of 1900 in second-feet	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage	Cost of superintendence	Cost of repairs for year
30	72.50	62	7,830	2,617	451	60	115.25	1,199	76	$ 602 00	$ 2,925 00
*31	......	......	......	......	......	......	......	......	......	......	......
*32	......	......	......	......	......	......	......	......	......	......	......
33	30.50	51.50	4,335	391	645	144	1,420	......	......	......	232 00
34	......	......	185	5,700	2,094	388	......	4,488	......	......	......
Totals	103.00	113.50	12,350	6,308	3,190	592	1,535.25	5,687	76	$ 602 00	$ 3,157 00

* No report.

HON. A. J. McCUNE,
State Engineer, Denver, Colorado:

Dear Sir—I beg leave to hand you herewith my report, together with the report of the several water commissioners for Grand river division No. 5, for the irrigation season of 1899.

Owing to the open, early spring, irrigation commenced in the valley sections of this division in March, and water was used continuously throughout the season until December. Water was abundant in nearly all of the districts with the exception of Nos. 40, 41 and 68, which are located in Delta, Montrose and Ouray counties, but through a system of rotation inaugurated by the commissioners of these districts the water was thus enabled to do double duty and insure to the farmers the finest crops ever raised in the valley.

It is worthy of note that the late snows which fell in the early months of 1899 were well preserved in the mountains by the cool weather which prevailed until June. Besides preserving the water for late irrigation, it saved us from the floods which usually occur in the small streams in seasons of warm weather in the spring, which occasion great damage through the washing of the light soil which forms the bottom land of the river ranches.

Contentions over water rights and the use of water were comparatively few, and the majority of these came from the small tributaries of the larger streams where water usually ceases to flow in June and July. I visited during the season ten of the districts in my division; the others needed no special attention. Those with commissioners having sufficient water for their needs were not hampered by controversy, and the commissioners were enabled to discharge their duties without my assistance.

The transfer of water under the new statute has, as far as my observation has extended, been very satisfactory to the water consumers, and although not generally in use owing to water conditions as previously stated, will, I am sure, in seasons of scarcity of water, be very beneficial.

In submitting their reports for the season the commissioners have the following to say:

Commissioner district No. 28, Thomas P. Goodman, says:

"I have made my report as accurately as I possibly can under present circumstances. I have twenty-four ditches adjudicated and there are as many more that ought to be. Ditches in this district are small and numerous and no weir devices to speak of. I have used every means to try and get the people to put in headgates and rating flumes, but some are very slow about it. I made a promise to some that I would get out in this month and put in some boxes at the expense of the owners; but owing to the snow storm, which has been falling for the past three days, to a depth of about twenty-four inches, without a sign of quitting, I don't believe I will be able to fulfill my promise."

Commissioner district No. 36, Howard W. Hill, no report. In communication received from Mr. Hill, he stated that no services were rendered by him during the season.

Commissioner district No. 37 writes as follows:

"Yours of December 8 just received; it had been in Red Cliff some time before forwarded. I wrote to you in July, reporting five days' services for month of May; also stating that supply of water in all streams in District No. 37 was unusually great, and there was no further need of my services during season. I did not have any blanks for crop report. The number of small ditches in No. 37 is very large and would have taken more than two blanks. I send the approximate totals of undecreed ditches. Concerning lately decreed ditches in No. 37, see pages 183 and 184 of Ninth Biennial Report. I would state that Ikes creek and Spruce empty into Grand river, and Allen ditch, Barrier ditch and Spruce Creek ditch No. 2 all belong to District No. 52. The Satton, Hernage and White ditches from Brush are among the oldest decreed ditches in District No. 37. Castle Creek ditch belongs to District No. 37. Castle creek is tributary to Eagle river, but does not average 10 per cent. of amount claimed.

The yield of crops has been very good the past season; alfalfa and timothy probably a little bit above the average; grain and potatoes just about an average; they are ripened a little too early by frost. In fact in seasons with scarcity of water, like 1896-1898, the quantity of crops was equal and quality better, because the irrigators took better care of the water and did not have a chance to drown part of their crops. On well-cared-for farms forty bushels of oats at forty-five pounds to the bushel, and four to five tons of hay is considered a fair crop on old cultivated ground. I have seen new ground yield from seventy to eighty bushels of such oats, but I have never seen new ground produce less than ten bushels of wheat to the acre, especially when the water supply was unlimited. The outlook for the coming season is shortage of water; up to the present time there is very little snow in the mountains."

Commissioner district No. 38, Geo. W. Hull, writes under date of December 12, in answer to inquiry for his report, that the same was sent September 29. It never reached my office, hence report from his district will have to be omitted.

Commissioner district No. 39, Frank D. Squires, under date of December 26, submits his report without comment.

Commissioner district No. 40, M. H. Payne, submits his report under date of December 27, stating that the season's water supply was very satisfactory to the people of his district, and that good crops were the result of the season.

Commissioner district No. 41, W. E. Obert, submits his report with comments on conditions in his district as follows:

"All crops were good except fruit and that was partially ruined by late frosts. Conditions differed very materially from the ordinary season. First, there was not sufficient water for all ditches during early spring, which is unusual; second, we had no high water or flood season; third, we had less water during latter part of August than was ever known to be flowing in this district. The extreme low water was caused by Ouray county, which is set apart in another district on the head of this river, and they using all the water in that district during the low water, as we received only about ten feet, and I think that was all seepage. You will therefore at once see that we are at a great disadvantage on account of two districts being on one stream.

"There have been a great many transfers or loans of water during the season of which I give you a record under separate cover; these loans resulted in much good, yet were of considerable inconvenience to me. Another condition I find which is very different from that reported by my predecessor, Mr. Christopher, last year, where he reports a loss in the river of more than one-third the water, I find a gain during low water of at least twenty feet from bridge at Montrose to the Garnet ditch, six miles south of Delta. I also wish to speak of the headgates, as many of them are in very bad condition, and some ditches have no rating flumes at all. I think it is of great importance to have all ditches provided with weirs and then rated by the State Engineer. This should be done prior to the opening of the irrigating season of next year.

"In behalf of the labor that was expended by me and my deputies, I will say that the river furnished water enough to supply all ditches for the extremely short period of sixteen days during the entire irrigating season. It therefore required diligent and almost constant labor to get the amount of water to the lower ditches to which they were entitled.

"The following transfers of water were made in this district during the season: On taking charge of my duties on May 27 I found that there had been transferred from Nos. 2 and 3 priorities thirteen feet of water to the Uncompahgre canal; the same was allowed to remain during the balance of the season. May 31, twenty-five inches of water was transferred from priority No. 4 to the Uncompahgre canal. June 7, ninetyeight inches of water was transferred from priority No. 12 to the Uncompahgre canal. June 20, eighty-five inches of water was transferred from priority No. 2 to the Garnet ditch. June 24, thirty-five inches of water was transferred from the Gus. A. Frost ditch to the Uncompahgre canal. June 27, three and three-tenths feet were transferred from the Homestake ditch to the Uncompahgre canal. July 5, one foot and one-fifth was transferred from Delta Canal priority No. 11 to Garnet ditch. July 8, one foot and thirty-two-hundredths was transferred from Delta Canal Priority No. 11 to Garnet ditch. July 10, all of priority No. 1½ was transferred to Garnet ditch. July 12, fifteen inches of water were transferred from priority No. 4 to Colorow ditch. July 25, one foot of water was transferred from priority No. 6 to Montrose canal. July 27, three and one-fifth feet of water were transferred from West Montrose ditch to Uncompahgre canal. July 28, two feet of water were transferred from Ross ditch to Uncompahgre canal. July 29, three feet of water were transferred from priority No. 13 to Uncompahgre canal. August 1, Chepeta Ditch Company transferred to Delta Chief eight feet of water. August 2, two feet of water of priority No. 8 were transferred to Uncompahgre canal. Same date, twenty-one and eight-tenths inches of water were transferred from priority No. 4 to the Uncompahgre canal. Same date, the Satisfaction Ditch Company transferred to Uncompahgre canal one foot of water. August 3, fifty inches of water were transferred from priority No. 4 to Uncompahgre canal. September 15, two and two-tenths feet of water were transferred from priority No. 4 to priority No. 15. The time of these transfers covers periods of from three days to three months. The water was of great benefit to those who were fortunate enough to receive it."

Commissioner district No. 42, W. H. Long, submits his report as follows:

"Under separate cover you will find my water report; it is complete as far as we have had anything to do with the distribution of water. I hope you will find the same satisfactory."

Commissioner district No. 45, Wm. Chadwick, submits his report without comment, but appends thereto report on reservoirs in his district as follows:

"Reservoir No. 2, priority No. 6, and reservoir No. 3, priority No. 7, opened July 22 to August 1; average flow of water fourteen feet per second of time. Reservoir No. 4, priority No. 8, and reservoir No. 5, priority No. 9, opened August 13 to August 22; average flow of water eight feet per second of time. Water from reservoirs turned into Battlement creek and distributed into ditches, taken from said creek."

Commissioner district No. 52, C. B. Rundell, submits his report and says:

"I mail you copy of report under separate cover. There seem to be several decrees granted to ditches that were never completed and some of the ditches have been abandoned. Some of the settlers do not know the names of their ditches or the priorities; there are a good many ditches used that have no decrees. I do not think that there is a man in the district who has a copy of his water decrees. I will try and be better posted to make a more extended report next season. Are there any blanks for making report of services to county commissioners? If so, where can I procure them?"

Commissioner district No. 53, C. M. Morris, submits his report with the following comments:

"We are not having much snow in this district and the outlook for water for next season is not favorable. The snow that falls late in the season does not answer the purpose for late irrigation."

Commissioner district No. 61, P. T. Mellon, submits his report without comment.

Commissioner district No. 68, P. H. Shue, submits his report with the following comments:

"I enclose reports for District No. 68; also report of time required. I began dividing water on May 10, and practically finished for lack of water to divide on September 22.

"I am at some loss to know just what ditches to report, as the blanks received will not include nearly all of my ditches. The enclosed list contains all of the principal ones taken from Dallas, Cow creek or Uncompahgre. Dallas received Leopard Creek ditch from San Miguel county, which was merged into ditches Nos. 38 and 40 and makes a source of supply for No. 31, Mayol lateral, priority No. 33. Leopard Creek ditch flowed about two second-feet in May, four and one-half in June, and three in July, after which it was not important in amount. Cow creek received water from Cimarron through Owl creek from about June 24, during the season. It possibly averaged five to seven second-feet up to September 1.

"There were two small ditches diverting some water from Animas river at Mineral Point. On June 28 these ditches were flowing, together, about three second-feet, but almost entirely ceased by July 15. The season, notwithstanding the abundance of snow and prospective favorable supply of water, was a very unusual one. Very high and constant winds, with cool weather, prevailed during April and May, so that the snow was greatly melted and covered with dust which accelerated its melting in a very short season. The preceding fall was very dry and the water from the melting snows in the spring were absorbed by the foothills; hence scarcity of water in the streams up to June 10. There was a decrease in the flow of water in the Dallas, and a short season, while Cow creek was comparatively above its usual flow. I have gauge marks placed at Ouray, mouth of Dallas, county line and junction of East and West Dallas.

"Uncompahgre showed but thirty-eight second-feet on September 20 and was not above thirty-five feet during most of October at Ouray. Coal creek and all small streams flowed barely enough for domestic local consumption; Billy, Burro and Onion creeks very little during the season. Owing to the scarcity of water and the large amount required for the first irrigation, the usual seepage flow was very greatly retarded and diminished. Abundant rains in July helped materially. During the middle of July and first part of August very little water was used.

"Pleasant valley is hardest to exhibit properly. Ditches Nos. 20, 38 and 40, besides waters of Von Hagen creek (no flow at all in 1899), are thrown into one valley and the water is used and reused by catching it up. Pleasant Valley creek also continuously discharges from two to five second-feet from the same seepage. Seepage has been very small in quantity generally, which has curtailed the expected supply of water. I think this is accounted for to some extent by the failure of the foothill snows to cause the streams to rise, and by the cold spring, so that irrigation was generally done by bunching the water and hurrying it over the lands.

"In midsummer there were copious rains, when this district practically used no water at all. The shortness of water in the smaller streams, especially West Dallas, caused me to supervise that division closely. I must compliment many of the citizens of No. 68 upon their consideration and willingness to share vested water rights. In many cases priorities have been voluntarily waived and a prorating or time division of water agreed upon for the season. The same course was often pursued among the ditch owners so that the water was more concentrated and run over the land more rapidly. This has been fatal to the usual seepage problems or storage supply by seepage. It was a revelation to me that the conditions could be so changed.

"Ditches Nos. 71 'A,' 75 'A,' 78, 79, 87, 91, 93, 104, 107, 108, were entirely devoid of water during the season of 1899. A great number of ditches from West Dallas, Lower Dallas, Coal creek, McKirsey creek, Leopard creek, Dexter creek, Alkali creek, Willow creek, Deer creek, Billy creek and Onion creek were short of water during the season because of lack of supply. The exhibit for all ditches except those which draw water from Uncompahgre, Cow creek and Dallas, with above exception, are deceptive. Water has been insufficient in most cases to raise crops. Heavy storms also destroyed ditches Nos. 1, 46, 49, 88, 92 and 95 in August, so that water did not flow in them for nearly a month. It is hard to average time and flow as a constant quantity is not required at all times."

Commissioner district No. 69, A. E. Arms, writes under date of December 11:

"I am in receipt of your letter of the 8th inst., enclosing blanks. I enclose herewith time reports for September, October and November, showing no services rendered. As to the annual report, I have to say that Rico is somewhat isolated from the agricultural part of this county, and I have never seen a ditch nor a crop, as I have had no official duties requiring my presence there. The reason for my appointment was that the people interested could not agree upon any one of themselves to be appointed commissioner. My knowledge of ditches, crops and conditions prevailing is nil."

District No. 42, W. H. Long, commissioner, reports on reservoirs in his district as follows:

	Number Days' Flow.	Average Flow Per Day.
Cottonwood Reservoir Company......	29	8.4 second-feet
Big Creek Reservoir Company.......	36	12.45 second-feet
Grand Mesa Reservoir Company.....	12	8.47 second-feet
Bull Creek Reservoir Company......	9	3.40 second-feet
Conn Creek Reservoir Company.....	8	1.34 second-feet
Grove Creek Reservoir Company.....	13	5.12 second-feet
Mesa Creek Reservoir Company......	14	9.18 second-feet

SERVICES OF WATER COMMISSIONERS AND DEPUTIES FOR SEASON OF 1899.

Number of commissioners on duty, 14; total number days' services, 908. Number of deputies on duty, 18; total number of days' service, 1,117.

Respectfully submitted,

A. F. REEVES,
Superintendent of Irrigation, Division No. 5.

Montrose, Colorado, December 30, 1899.

SUPERINTENDENT'S REPORT, A. D. 1899.

WATER DIVISION NO. 5—GRAND RIVER DIVISION.

No. of District	Ditches—Length thereof in miles	Average amount of water carried during season of 1899 in cubic feet per second of time	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage	Cost of superintendence	Cost of repairs for year
28	45	69	8,873.95		1,085	5,050		274			
*36											
37	95	245	12,400	3,660	2,120	1,275		5,195		$ 100 00	$ 900 00
*38											
39	145	132	15,220	4,634	116	322	1,769	2,030		610 00	4,318 50
40	195	190	96,617	10,890	733	760	3,399	2,064			
41	256	125	58,866	13,125	400	600	2,981	10,876	310	3,600 00	4,000 00
42	178	165	18,968	7,966	25	341	1,055	2,676	348		1,896 40
45	127	120	15,737	4,135	234	333	541	1,652			
*50											
*51											
52	22	51	1,403	249	544	70		89	33		246 00
53	51	73	6,312	1,964	1,690	1,073	24	25	55		
*59											

*60											
61	23	11	2,275	405		215	49	141		$ 617 50	
*62											
*63											
68	211	228	20,138	4,074	3,896	2,056	110.50	3,229	730		$ 4,070 00
*69											
Totals	1,348	1,409	256,809.95	51,102	10,843	12,095	9,928.50	28,251	1,476	$ 4,927 50	$15,430 90

* No report.

HON. A. J. McCUNE,
State Engineer, Denver, Colorado.

Dear Sir—I transmit herewith my report as superintendent of irrigation of Grand river division No. 5, together with the tabulated report and written statements of the several water commissioners on duty in my division for the irrigation season of 1900.

This year, unlike the preceding one, will be chronicled in the history of this division for its shortage of water throughout the entire season. While an abundance of snow fell upon the water-sheds in the early months of the year, it was not lasting, and the water passed off rapidly and disappeared, leaving us in the months of July and August in several of the districts with hardly sufficient water to moisten the beds of the streams. The early spring was very cold, and in the valley districts water was insufficient to start the crops. Early in June the water became excessively warm, and the snow from the water-sheds disappeared rapidly, so that the latter part of June found us in such districts in which reservoirs were located, almost compelled, for the preservation of crops, to draw on the storage supply. It is impossible to describe to you, or to convey a correct idea of the conditions which prevailed in the different districts comprising this division. Suffice it to say that the average water user is not mindful of decrees when his own individual interests are at stake; his main object is to obtain water regardless of the law or the rights of others. Such were the conditions in some of the districts that we were confronted with a serious problem. To arrest all illegal water users would have caused no end of litigation, and in the majority of cases would have resulted in the acquittal of the accused. The cost of these suits to the several counties would have been enormous. I therefore consulted with several of the water commissioners and we came to the conclusion that the best method to adopt was to appoint sufficient deputies to police the rivers, shutting the headgates of the ditches that were not entitled to water when found open. This method we found very satisfactory; it resulted in a great saving to the counties and enabled us to deliver what little water there was to the rightful owners.

I would here suggest that an amendment be made to the present law governing the prior rights to the use of water, relieving the commissioners of the burden of proof in the matter of water stealing. In other words, amend the law that when water was found in ditches after the commissioner had shut the headgates and notified the superintendent or ditch owners that there was no water to be delivered to them under the priority attached to said ditch, it would be prima facie evidence of the guilt of the owners of said ditch that they had unlawfully procured water to which they were not entitled. Should this law be enacted it would relieve the commissioner of a great responsibility in the discharge of his duties. It would also save to the counties the salaries of the numerous deputies which it is necessary to employ to properly distribute the water. I can not too strongly recommend this to your earnest consideration.

There is another requirement of the present statute which should be changed, and that is the law relating to headgates and measuring boxes. As the law now stands, should the ditch owners refuse or neglect to put in properly constructed headgates and measuring boxes, it becomes the duty of the commissioner to construct the same himself or cause it to be done, and if the ditch owners refuse to pay, his redress is a suit at law to recover. The absolute necessity of these headgates and measuring boxes is well known to you. I find, however, that the commissioners are slow to carry out the provisions of the law, many of them not having sufficient means to pay in advance for these gates and measuring boxes or to employ attorneys to represent them in recovering the amounts expended. I would, therefore, recommend that this law be changed and that the commissioner be empowered to have the necessary headgates and measuring boxes constructed at the expense of the counties wherein said ditches may be located, and if the same is not paid by the owners of the ditches wherein the headgates are constructed, that the water commissioner shall prepare a correct bill of expense, under oath, which shall be filed with the county clerk and shall be paid by the county commissioners as other county indebtedness; and that the amount of said bill shall then be charged by the county treasurer or assessor of the county in the taxes of the individual owners of the ditch causing the expense. These are merely suggestions which might be formulated into bills to be presented to the coming legislature.

Although the scarcity of water has had its accompanying evils, yet it has not been without accomplishing some good. It has brought the people of those districts wherein the shortage occurred to a realization that they must seek a remedy, either by the storage of water in reservoirs or the building of ditches from streams that have an abundance of water; but owing to the enormous cost of constructing these ditches up to the present time the people have not had the courage to embark in such enterprises.

In district No. 41 the construction of the Cimarron ditch has been commenced. The cost of construction is estimated at $40,000. Its length is twenty-six miles, with a carrying capacity of one hundred second feet. Its headgate will be located at the foot of what is known as Jackson park, on the Big Cimarron river. Its course is along the west bank of the Cimarron river to the top of Cerro Summit, where it will empty into Cedar creek, and through Cedar creek to the Uncompahgre valley. By gauging this river at different times during the season I found that the lowest water would afford them fifty cubic feet, when there was practically no water at all in the Uncompahgre river. This is only one of the many talked-of improvements in the irrigation system of district No. 41. Reservoir sites have been located, and surveys are now being made to ascertain the cost and most feasible route for bringing the waters of the Gunnison river into the Uncompahgre valley. It is well known that at all seasons of the year the Gunnison river affords a large volume of water; that the claims now made upon it for irrigating purposes are very small. But if this water could be brought through into the Uncompahgre valley from 300,000 to 400,000 acres of land could be brought under cultivation, and the question of shortage of water for those who are already located in this valley would be permanently settled. The Hon. John C. Bell, member of congress from the Second district of Colorado, in a letter just received, expresses himself on this subject as follows:

"I hope you will all have a nice winter, an early spring, and that you will not fail to press the Cimarron to the front as soon as the frost is out of the ground.

"We are working closely with the representatives of the arid land states and the member of the geological survey who believes with us in public reclamation, but before a great government, moving as this one does in all great enterprises, could divert the Gunnison, the Cimarron would pay for itself many times over. The great interest taken in the Gunnison there is a splendid thing, and the more the subject is agitated the more chances it will have of being selected when the government does enter upon reclamation, or whatever the state can be induced to do thereon will be so much gained whether it completes it or not, as this river will certainly be diverted into that great valley in the future, as time goes on.

"However, we should not become at all lax on the Cimarron. We must have that, both for domestic and irrigation purposes, and immediately, and by keeping the sentiment alive, it seems to me this work might be done next year. By all means, let us have an early spring force on the ditch and have it vigorously pressed while water is abundant and the ground soft.

"There is no question but the people of the valley lost much more on crop shortage last year, by not having the water, than the estimated cost of constructing the ditch. The people should not be discouraged by the ideas of some skeptical persons who believe there is not water enough to justify the outlay. We must bear in mind that the Cimarron does not run down so early in summer as the Uncompahgre; that it has many more swells during the dry season, from the great rains around Uncompahgre Peak, than the Uncompahgre, and when the swell comes the people of Montrose and Delta counties get the benefit without a division with the people of any other counties. This addition will help us out wonderfully and the flow will be almost doubled; in addition it will give the town of Montrose, for the first time in its history, good domestic water. This winter is the time to thoroughly organize the forces, and they should be moved as soon as the ground will permit."

In district No. 40 there are now about 100 large and small reservoirs which have this season practically saved the crops in that district, thereby demonstrating their vast importance as an irrigation factor. The cost of constructing the numerous reservoirs in this district was very nominal in most cases, as the topography of the country furnished natural basins, so little work was required. I find throughout this division that most of the cultivated land is located along the smaller streams. The natural flow of these streams is usually exhausted by July, or so diminished that a few of the early priority holders receive all of the water. It is therefore only natural, from a standpoint of self-preservation, that the late priority holders will be compelled to seek suitable reservoir sites and store the early waters, which, at the present time, are allowed to waste into the larger streams, which swells them beyond their carrying capacity, causing great damage along their courses.

The transfer of water under section 3, of chapter 105, Session Laws of 1899, which permits water users to loan their water one to another, was certainly a great boon to the farmers during the season just passed. While there is no law which is not subjected at times to severe strain by the construction placed upon it by different minds, and this has been no exception to the rule. From my experience in its operation, I heartily endorse it and trust that it will not be molested or amended in any way during the present legislature. I consider that it has been of the value of at least $100,000 in crops in my division alone.

I can not too highly praise the sincere effort of each commissioner in discharging his duty, and I desire to thank them for their earnest co-operation in the discharge of mine.

Commissioner of district No. 28, Thomas P. Goodman, reports sufficient water throughout the season, but that headgates and measuring boxes are in poor condition; that he has endeavored to compel the ditch owners to construct proper headgates and measuring boxes, but has been unsuccessful in a great many cases.

Commissioner of district No. 36, Howard H. Hill, reports no services during the season.

Commissioner of district No. 37, Andrew Kalquist, no report.

Commissioner of district No. 38, Geo. W. Hull, submits his report without comment.

Commissioner of district No. 39, Frank D. Squires, submits his report without comment, showing twenty-one loans of water for an average of thirty days, said loans being made under section 3, of chapter 105, of Session Laws of 1899.

Commissioner of district No. 40, M. H. Payne, submits his report with the following letter:

"In submitting this report for the year 1900, I would say we have had a very good crop year in this district. Although unusually dry, and the natural flow rather short from the streams, the reservoir water more than made up the difference and resulted in good crops. The storage of water has been of great value to the people of this district, especially on Tongue creek and Surface creek, where special attention is given to reservoirs. We have on the head of Tongue creek twelve natural lakes, partly reservoirs, which furnished 75,000,000 feet of water. The Surface Creek Ditch and Reservoir Company had stored on Ward, Cottonwood and Kiser creeks 150,000,000 feet of water. The Trickle Park reservoir, near the head of Surface creek, contains 169 acres, with storage capacity of 95,000,000 feet of water. The Tongue and Surface creek natural flow, together with the reservoirs above named and numerous smaller reservoirs, aggregating perhaps 100,000,000 feet of water, in addition to the amounts already given. The valleys and mesa lands of these creeks were therefore fairly well watered. The greatest shortage of water was on Rogers' mesa, which depends, for the present, on Leroux creek, but will be greatly benefited by the Fire Mountain canal from the North Fork of the Gunnison, which is now nearly completed. „

"On Leroux creek there are few natural reservoir sites. There are now twelve reservoirs on this stream, the largest of which contains about fifty acres.

"Compared with former years, there was but little interference with headgates by water users. One arrest was made during the season. William Hathaway was arrested for opening the headgate of the Highline ditch No. 7 on Leroux creek. He attempted to keep the same open by use of firearms, defying myself and deputy. He was, however, overpowered, disarmed and arrested. A preliminary trial was had and he is now under bond awaiting trial at the next term of court."

Commissioner of district No. 41, W. E. Obert, submits the following report:

"From July 10 to this date, the 21st, there has not been enough water in Uncompahgre river to supply priority No. 20. And from July 20 to September 11 there was only enough to supply 1½, 2, 3 and 4 priorities, which caused great injury to crops. On November 3, 4 and 5 Mr. Trimble, of Fort Collins, took measurements of seepage in this district, but no report has been made yet.

"The loaning of water for a limited period of time has been a great relief to numerous ditches having late or no decrees at all. On May 16, 1900, had sufficient supply of water for all ditches for the first time during the season. Dry creek reached through to the river on May 11. Spring creek reached through on May 12. May 18 I went off duty on account of cold weather; was called on again May 21. On May 24 there was enough water to supply all ditches again. On August 1 there was fourteen feet of water at headgate of the Uncompahgre canal. On August 15 but seven feet. On August 10, at 7:30 a. m., the canal was closed, shutting out a head of twelve feet of water; at 2 p. m. the increase reached Stark's bridge, four miles below, and some time during that night reached Lott's ditch, six miles below. On August 11, at 9 a. m., five feet were passing Lott's ditch; at 5 p. m. reached the Town ditch, where two feet were taken, and three feet reached the Valverde ditch in the night and remained in this condition until the 12th. The canal re-opened at 6 p. m. on the 11th, taking all the water of the river. On August 8, 9 and 10 Messrs. Horton and Harris worked nights on the river from Olathe up. No headgates were raised and the usual amount of five feet passed Olathe unmolested and one and one-half to two feet reached priority No. 1½.

"As a supplement to my report, I would make several suggestions, as I omitted mentioning the reservoir that is now being built, with two others located. The one that is at this time nearing completion is located on sections 27, 28 and 34, township 51, north range 10, W. N. M. M., and when filled will cover 167 acres at an average of seven feet deep, making a total of 1,169 acre-feet and is named the Bonnie reservoir. The enterprise is being carried on by the people of Garnett mesa. The outflow from these reservoirs will go directly into the Garnett ditch, which covers 1,000 acres of the finest fruit land on the western slope.

"The other two locations are directly above the present one, in what is known as Hammond gulch, Montrose county. I have recommended the building of more reservoirs, as I believe favorable locations can be found.

"A ditch is also being constructed to carry the excess water of the Cimarron river into the Uncompahgre valley, which will perhaps double the amount of water in this district during low water season. I would also recommend that the whole Uncompahgre river be made one district, believing that greater good could be accomplished.

"The number of loans or transfers of water under section 3, chapter 105, Session Laws of 1899, were thirty-three, being made for from fifteen days to three months."

Commissioner of district No. 42, Geo. Hall, submits his report with the following comments on reservoirs:

"B. C. reservoirs (Big creek), capacity 29,000 acre-feet; water used from July 3 to August 15; average flow thirty-four and nine-tenths second-feet. Cottonwood reservoir, capacity 1,163 acre-feet; flow from July 22 to August 11; average run of water ten second-feet. Bull Creek reservoir, capacity 200 acre-feet; water used from July 17 to August 25; average flow of water three cubic feet. Mesa Creek reservoir, capacity 900 acre-feet; water used from July 10 to August 12; average flow of water twenty cubic feet. Kannah Creek reservoir, capacity 1,015 acre-feet; water used from July 5 to August 15; average flow of water twelve and eight-tenths second-feet. The majority of headgates in this district are good. Have a few ditches with none at all, and a few headgates which are no account."

Commissioner of district No. 45, E. L. House, submits his report with the following comment:

"There were thirty-five loans of water under chapter 105, section 3, Session Laws of 1899. Owners of water and water rights taking water from the same stream, having the right to loan water to each other for a limited time, have saved hundreds of young fruit trees and truck patches in District No. 45 this season. Water was turned in from reservoirs on July 16 and continued to flow until July 27 with an average flow of 102 2-10 feet."

Commissioner of district No. 52, C. B. Rundell, submits his report with the following information:

"The following ditches have been using water that have not been decreed: Mugrage, Unghern, McPhee, Phillifer, Freeman, Rock Creek, Box Canon, Kid Ranch Box Canon, Brunner Stark Creek, and four ditches out of Catamount creek. North Piney ditch washed out in the spring of 1899 and has not been repaired. Hartman ditch received no water until about the middle of July and then there was only just enough to run through the ditch. There were no services rendered by me during the months of April, September and October of this year."

Commissioner of district No. 53, John C. Richardson, submits his report with the following comment:

"I enclose you my report in separate mail. It is not as complete as it should be on account of not receiving my commission until late in season; also on account of numerous transfers of ditches to other parties and the ranches run by leasers or foremen, who know nothing of the names of ditches. I find owners ignorant of the names of their ditches, and indifferent as to supplying me with information; say it is of no consequence and only an additional expense to the ranchmen for nothing. A good many ditches need headgates, also measuring weirs. Some think, because they do not damage anything, they are not required to put in headgates or measuring boxes, when they can divide the water with their neighbors without. Shall I compel the compliance with the law or let them alone? Some places I have to measure the water in the ditch without weirs, which is not a very accurate way of measuring. You will find no report on wheat or oats as they are only raised in our country for chickens. Crops are good; second crop not so very good on account of dry weather and cold nights.

"Sterner reservoir, capacity 3,600 feet; average flow throughout the season, two feet.

"Keener reservoir, capacity 720,000 feet; flow August 20 to September 1, eight cubic feet."

Commissioner of district No. 61, Wm. Williams, reports that the flow of water throughout the season in his district remained about the same, as the supply is furnished by living springs. No small grain was raised in this district.

Commissioner of district No. 68, P. H. Shue, reports as follows:

"Transfers of water under section 3, chapter 105, Session Laws of 1899, eleven; average time of transfer, fifteen days.

"There is a quantity of water drawn from Leopard creek through Leopard Creek ditch No. 20, from San Miguel county. This flows from three to ten second-feet up to July 15. West Dallas creek never flows sufficient water; usually about ten to twenty second-feet. During the past two years the owners of ditches from this stream have waived priority rights, and mutually agreed to permit the water commissioner to prorate the waters on a time division between the ditches. It has worked very satisfactorily and economically. The supply of snow was very limited up to April 10, after which time there were heavy snows on the head waters. This condition was of material advantage for a good supply of water, but went off very rapidly, especially during the last days of June. This permitted ample irrigation during May and June and secured a heavy seepage flow for the later season. Cow creek was lower than ever before known, gauging only twelve and five-tenths second-feet on August 8 above ditches. Uncompahgre was down to sixty-seven second-feet on August 30, but not falling greatly below this for September. November 1 it gauged less than forty second-feet. All the smaller streams were practically dry by July 15. Coal creek being an exception, as it kept up a fair flow to September. After July 26 several ditches were cut off, which occasioned some loss in crops. I instructed my deputies to police the streams and see that only those who were entitled to water received it. We experienced but little difficulty. The temporary loan law seems to be a good provision, as it offers legal means to get water at critical times. I found a tendency to abuse its provisions and refused in several instances to recognize transfers, compelling consumers to make the best use of the water."

Commissioner of district No. 69, A. E. Arms, reports no services.

Respectfully submitted,

A. F. REEVES,
Superintendent of Irrigation, Division No. 5.

Montrose, Colo., December 26, 1900.

VIEW ON GRAND VALLEY CANAL, NEAR GRAND JUNCTION, COLORADO.

SUPERINTENDENT'S REPORT, A. D. 1900.

WATER DIVISION NO. 5—GRAND RIVER DIVISION.

No. of District	Ditches—Length thereof in miles	Average amount of water carried during season of 1900 in cubic feet per second of time	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage	Cost of superintendence	Cost of repairs for year
28	42	120	7,131	------	------	7,046	------	85	------	------	------
*36	------	------	------	------	------	------	------	------	------	------	------
*37	------	------	------	------	------	------	------	------	------	------	------
38	212	250	16,910	8,490	------	554	115	8,108	------	------	------
39	213	180	11,247	5,310	------	589	1,666	2,682	------	------	------
40	331	200	98,809	14,205	------	1,354	4,933	7,527	------	------	------
41	245	100	60,666	19,338	------	1,000	2,207	8 121	------	------	------
42	125	100	70,536	7,852	------	127	739	1,634	------	------	------
45	173	145	11,100	6,407	------	2,035	642	2,026	------	------	------
*50	------	------	------	------	------	------	------	------	------	------	------
*51	------	------	------	------	------	------	------	------	------	------	------
52	25	25	831	275	------	535	------	24	------	------	------
53	53	125	6,290	2,631	------	4 574	2	20	------	------	------
*59	------	------	------	------	------	------	------	------	------	------	------

* No report.

SUPERINTENDENT'S REPORT, A. D. 1900.

WATER DISTRICT NO. 5—GRAND RIVER DIVISION—Concluded.

No. of District	Ditches—Length thereof in miles	Average amount of water carried during season of 1900 in cubic feet per second of time	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage	Cost of superintendence	Cost of repairs for year
*60	------	------	------	------	------	------	------	------	------	------	------
61	22	8	834	465	------	215	56	116	------	------	------
*62	------	------	------	------	------	------	------	------	------	------	------
*63	------	------	------	------	------	------	------	------	------	------	------
68	161	125	13,792	3,842	------	4,088	52	5,730	------	------	------
*69	------	------	------	------	------	------	------	------	------	------	------
Totals	1,602	1,378	2,498,146	68,815	------	22,117	10,412	36,073	------	------	------

* No report.

Hayden, Routt County, Colorado, December 29, 1899.

HON. A. J. McCUNE,
State Engineer, Denver, Colorado:

Dear Sir—I hereby submit to you my annual report as superintendent of irrigation of irrigation division No. 6, otherwise known as the Green river division. Also the enclosed report from the only water commissioner in this division, namely, Mr. J. D. Moog, district No. 43.

He is one of the best and most reliable water commissioners we have, I believe, in the state, and faithfully and cheerfully performs all duties imposed upon him and does as the law directs in his official capacity.

The irrigation season opened with an unusual supply of snow in the mountains, followed by numerous rains throughout the season, thus securing good crops to all, providing no other obstacle presented itself. But later on in the season Mr. Jack Frost made himself known to all grain growers in this division; the grain crop, although a very large acreage, was almost a failure on account of a very early frost, hence oats especially command a very high price. The hay crop is a good average one. The stock range at large was especially good.

We had very little difficulty with ditch owners the past season. I had very good success by simply writing to ditch owners not having prior rights to shut their headgates to their own ditches so that those having prior rights would not be injured thereby; in most all cases the requests were complied with, so that I had to make no official visit, a few simple words on paper having the desired effect.

There being only one water commissioner in this division, where there should have been five, the larger portion of the work devolves upon myself, which is not very satisfactory from a financial point of view, or from any way one may look at it. This season I have saved Routt and Rio Blanco counties at least two hundred dollars that I could easily have made by making official calls on ditch owners, but I used some paper and postage stamps instead, and it worked wonderfully well and succeeded in all cases where disputes arose among ditch owners.

This division is attracting a large number of settlers every season, and there is room for many more for years to come. The division is only in its infancy in the way of irrigation problems. The amount of water running to waste every season is almost beyond the imagination of man. If this water could be successfully stored in reservoirs the acreage would be more than doubled, for, practically speaking, the best land is still open to settlement, as the mesa lands are far superior to the river bottoms in richness.

Rotation has been practiced to some extent, and with success. I would earnestly recommend that it be still more thoroughly put in use by those living where there may be a scarcity of water. It would avoid trouble and the hard feelings that usually arise among ditch owners.

The total number of days employed in the discharge of my duties as superintendent of irrigation of division No. 6 was twenty-two.

Enclosed find tabulated statement of ditches decreed this season; also report on ditches, and acreage and amount of water used, together with report of water commissioner of district 43.

Before I close this report I would say, that the land capable of irrigation would be three times its present amount.

Allow me to thank you for your kindness during the past season in your affairs with this office.

Yours very truly,

C. S. ROBERTS,

Superintendent of Irrigation of Division No. 6.

Meeker, Colorado, November 5, 1899.

HON. C. S. ROBERTS,
Superintendent of Irrigation, Division No. 6, Hayden, Colorado:

Dear Sir—The past irrigation season of 1899 was an exceptionally favorable one in this district. On account of the heavy snowfall last winter and frequent rains during the summer the water supply during the season was better than it has been for several years.

On Piceance creek there was plenty of water to go around, also on Black Sulphur creek; never had to shut off any ditches taking water from these creeks.

On Upper Piceance creek the ranchmen used the water alternately without any trouble.

On Dry Piceance or Thurman creek, pending the settlement of the lawsuit between Hayes and McLaughlin according to agreement between the parties, I gave all of the water to each alternately for five days. Hayes has bought out McLaughlin since and the lawsuit is off, Hayes paying the costs, so there will be no more trouble in that neighborhood.

The case of Leonard vs. J. D. Moog et al. has not been decided as yet. Both attorneys were to file briefs within twenty days, and then Judge Rucker will decide. If he decides against me I am going to the Supreme Court. After that I am going to resign as water commissioner of district 43 because the county commissioners refused to pay my expenses in this suit and the parties interested in the case only paid me $45.00.

On Coal creek I shut down all the ditches excepting Coal creek No. 1, Coal creek mesa, Little Beaver and Martin ditch, on June 1. On June 10 I shut down Coal creek mesa. On July 26 I gave Coal creek mesa ditch water again, Coal creek No. 1 not using it, and turned it down again for Coal creek No. 1 August 30.

On Flag creek everybody had water up to June 21. I then turned it all down to B. A. & B. ditch for six days, and then alternately to Rooney and Melvin ditches and to Howey ditch. They all raised good crops on Flag creek. I spent some time in repairing headgates and measuring flumes and put in some new ones.

New headgates and measuring weirs combined in Melvin ditch, two in Howey ditch, one in B. A. & B. ditch, Youch ditch, measuring flume in Coal creek No. 1, Metz, Metz and Reigan, Piceance ditch and Emily ditch.

Worked sixty-seven days.

Very respectfully,

J. D. MOOG,

Water Commissioner, District No. 43.

Hayden, Routt County, Colorado, November 28, 1900.

HON. A. J. McCUNE,
State Engineer:

Dear Sir—I have the honor herewith to submit to you my annual report as superintendent of irrigation division No. 6.

There being no ditches decreed in district 55, there are no ditch rights to attend to.

In water districts Nos. 44, 54, 56, 57 and 58, there being no water commissioners, the duties of such rest with myself, who am generally applied to for relief. In a great many cases when a call is made for me to go and distribute water I have sent letters, which are generally adhered to, and my request complied with. It is very seldom that I have to make the second appeal to shut off headgates. In fact, I have no complaint to offer on that score.

Water district No. 58 comprises all the land subject to irrigation which draws its supply of water from Elk river and the Yampa river above the mouth of the Elk river and its tributaries.

There are 132 decreed ditches in this district, besides a number without decrees, 230 miles in length. The increased acreage over the past season, according to the number of new ditches decreed, will exceed the report of last year by over 1,500 acres. For the past few years this district has made greater progress than any other in the division.

The principal crops being raised are as follows: By far the larger portion is hay, comprising chiefly timothy and native grasses; alfalfa does not seem to be as much of a success, still there is quite an acreage in alfalfa. The grains comprise oats, barley, rye and wheat, the larger crop being oats, barley and rye. The majority of the grains are generally raised here without the aid of irrigation, but this season's crop, without irrigation, was almost a failure, owing to the severe drought. There was scarcely any rainfall during the whole season, hence the grain crops especially were very short—almost a failure with a great many ranchmen. The hay crop is also below the average in yield, more on account of the season than because of the scarcity of water, for the larger portion of irrigation farms have an almost unlimited amount of water. The principal drawback with most ditches is that they are not kept in good repair, hence the ditch will not carry the water, and the crops are short on that account in many cases. Land owners are slow to understand why crops are short, while if they would put in some of their time in the fall repairing their ditches the reward for the labor would more than repay the outlay in expenses. This district is not alone in this respect, the same being true in almost all the rest of the districts in this division.

The following streams were short of water early in the season in district No. 58: Walton creek, Oak creek, Deep creek, and the balance of the lesser creeks were either short of water or were entirely dry.

There being no water commissioner in district 58, I was employed ten days in the distribution of water on Farnsworth, Walton and Oak creeks.

There is yet a large amount of land opened for settlement in this district that could be brought under cultivation by irrigation, either by enlarging some of the ditches already decreed or building new ditches and reservoirs. There are only one or two reservoirs in use as yet, but a great many more could be built without any large expenditure of time and labor. The amount of expense in keeping ditches in repair amounts to only a few dollars per year on the average. There are a great many ditches that have never been cleaned out since being built several years ago.

Water district No. 57 embraces a large area of land, including 54 decreed ditches, together with the various enlargements, and 140 miles in length. Acres irrigated, about 14,000; fruits, eight acres.

This district is one of the best located in this division as regards climate and water supply, and has generally good crops every season, the timothy hay being the largest, next coming alfalfa and native grasses following. The hay crop is a little below the average, and the grains are short in acreage also. The usual yield for oats, from 35 to 60 bushels per acre; wheat, 25 to 50 bushels per acre; barley and rye are also raised in smaller amounts. Small fruits are raised in abundance, but the acreage is not large. Very few of the standard fruits do any good, owing to early frosts.

This is indeed a country for the stockman, with plenty of range in summer and large hay stacks for feed for the winter.

The reservoir system is being adopted on a small scale with good results. There are also plenty of openings still remaining vacant for any one in need of such lands. There is an unlimited amount of water running to waste in the early spring that could be stored in reservoirs for future use.

Water district No. 56 contains in number only ten decreed ditches. Length in miles, 20. Amount irrigated therefrom, 700 acres.

This district is the land where it is all the year round almost like summer. There is very little snowfall in the valley during the winter months. Ranchmen raise almost anything that can be raised in a garden. This section is also adapted to stock raising, but it is as yet very sparsely settled. Crops average. Water supply short on south fork Vermillion creek.

Water district No. 54 has in number 25 decreed ditches, being 60 miles in length.

There are a few of these ditches used for mining purposes, the rest being used for irrigation.

Timothy hay is chiefly being raised. The soil is well adapted for the raising of alfalfa. The hay crop about the average. Grain crops are rather short this season, oats being in the lead. Increase in acreage, 200 acres over last season. Water supply short on Four-Mile creek.

Water district No. 44 has in number 40 decreed ditches, with 61 miles in length. Acres irrigated, 7,000.

Timothy hay and native grasses in the lead, but there is a great deal of alfalfa raised. The crops are somewhat below the average.

Water supply short on Good Springs creek, Wilson creek, Milk creek, Mogeropets creeks and some of the lesser streams. Acres in small fruits, four. I saw some fine looking apple trees just bearing fruit. Garden produce of all kinds does well in this district.

The Hulett reservoir is a great success and has plenty of water.

Water district No. 55, no ditches decreed. This district will make one of the finest in this division when properly developed, for it has plenty of land and water to be used for those who have the money and the push in them.

Concerning the exchange or loan of water right between ditch owners on the same stream, I have believed in the same for a good long time past, and have always given advice to ditch owners on streams to exchange with each other, as that will, in a great many cases, prevent those hard feelings that usually arise between owners of ditches. I believe the law to be all right, as I have seen nothing bad resulting from the exchange.

The county officials do not see any use for a superintendent of irrigation for this division. That is the reason I am not able to give an account of this division as it deserves, for it should be in the front and not where it now is—next to nothing. You will be able to see why there is no better crop report, and a great many other reports that would be a benefit to all, and more especially to this division.

There has been such a demand for advice on ditch rights that it has kept me quite busy at times answering and giving an opinion on different subjects of irrigation, and I believe it has been a saving of many lawsuits, the parties getting the advice free.

The snowfall of last winter was light, and hence the water supply shorter than usual, and besides the season was one of the dryest in years.

As early as this date it looks like a good supply of snow in the mountains for the coming season of 1901. Reports give a large fall of snow for this early in the season.

One cubic foot of water per second of time is allowed for each 60 acres under ditch for irrigation in this division, with the exception of water district No. 43, where the ditches are decreed one cubic foot for each 50 acres.

A copy of ditch decrees enclosed, as taken from copy received from the clerk of the District Court.

In water district No. 43 the work of the commissioner, J. D. Moog, has been generally satisfactory, as there has never been an appeal to me to go there to settle any disputes. But there has been granted by the District Court an injunction restraining either the water commissioner or myself from interfering with certain headgates of one particular party, who, I believe, takes water not according to law or justice, but it is not for me to criticise those who have the authority to give the injunction. Mr. Moog has had large experience in the office he now holds and has shown good judgment under the circumstances with which he has to labor.

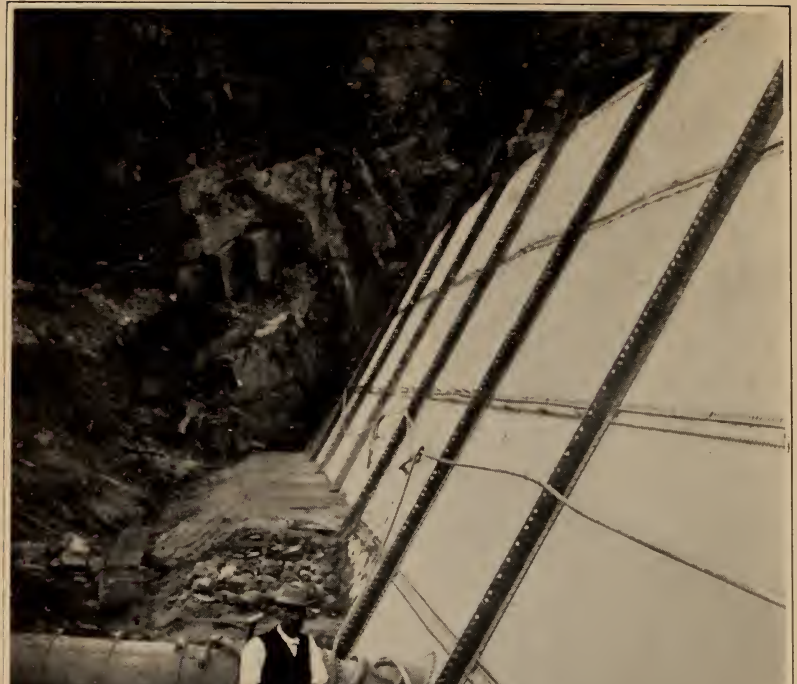
Yours very truly,

C. S. ROBERTS,
Superintendent of Irrigation, Division No. 6.

SUPERINTENDENT'S REPORT, A. D. 1899-1900.

WATER DIVISION NO. 6.

No. of District	Ditches—Length thereof in miles	Number of days water was carried therein	Average amount of water carried during season in cubic feet per second of time	Number of acres that can be irrigated therefrom	Number of acres of alfalfa irrigated therefrom	Number of acres of seeded grasses other than alfalfa irrigated therefrom	Number of acres of natural grasses irrigated therefrom	Number of acres of fruits irrigated therefrom	Number of acres of other crops irrigated therefrom	Number of acres irrigated from seepage
43, 44, 54, 55, 56, 57, 58—Totals, 1899	545	110	890	93,000	6,025	27,324	16,000	23	6,800	135
43, 44, 54, 55, 56, 57, 58—Totals, 1900	565	110	900	95,200	7,000	28,000	16,500	31	7,000	150



STEEL FACED DAM OF PIKE'S PEAK POWER CO., NEAR VICTOR.

CHAPTER V.

SUMMARY OF DITCH AND RESERVOIR FILINGS

FROM DECEMBER 1, 1898, TO DECEMBER 1, 1900.

DIVISION NO. 1

District No.	Number of Ditches	Capacity Claimed in Second-Feet	Number of Reservoirs	Capacity in Cubic Feet
1	19	1,442.40	4	48,882,000
2	6	139.25	4	316,602,460
3	20	473.60	8	603,203,400
4	9	58.50	8	683,528,596
5	None	----------------	3	1,532,462,580
6	10	110.25	4	15,003,940
7	8	178.06	7	29,394,875
8	7	27.06	4	38,068,435
9	None	----------------	None	----------------------
23	11	127.75	2	321,386,310
46	5	85.50	None	----------------------
47	14	190	None	----------------------
48	2	127.90	1	196,020,000
64	3	387.50	None	----------------------
65	2	16	1	1,005,000
Totals	116	3,363.77	46	3,785,557,596

SUMMARY OF DITCH AND RESERVOIR FILINGS

FROM DECEMBER 1, 1898, TO DECEMBER 1, 1900.

DIVISION NO. 2

District No.	Number of Ditches	Capacity Claimed in Second-Feet	Number of Reservoirs	Capacity in Cubic Feet
10	15	108.52	7	5,757,818
11	6	41.20	None	
12	10	289.75	11	728,362,953
13	None		None	
14	5	8.25	None	
15	2	31	1	145,490,400
16	18	101.31	6	30,293,850
17	11	3,793.90	3	496,584,000
18	None		None	
19	6	142.64	5	518,330
49	2	85.91	None	
66	2	5.75	None	
67	13	1,694.33	3	290,000,000
Totals	90	6,302.56	36	1,697,007,341

SUMMARY OF DITCH AND RESERVOIR FILINGS

FROM DECEMBER 1, 1898, TO DECEMBER 1, 1900.

DIVISION NO. 3

District No.	Number of Ditches	Capacity Claimed in Second-Feet	Number of Reservoirs	Capacity in Cubic Feet
20	12	73.50	None	
21	None		None	
22	None		None	
24	1	116	5	980,721,815
25	4	26.87	None	
26	7	96.28	None	
27	None		None	
35	None		None	
Totals	24	312.65	5	980,721,815

SUMMARY OF DITCH AND RESERVOIR FILINGS

FROM DECEMBER 1, 1898, TO DECEMBER 1, 1900.

DIVISION NO. 4

District No.	Number of Ditches	Capacity Claimed in Second-Feet	Number of Reservoirs	Capacity in Cubic Feet
29	8	460.50	None	
30	12	229	5	16,022,800
31	19	2,497.75	1	11,669,724
32	1	2.50	None	
33	14	281.35	None	
34	2	12.20	None	
Totals	56	3,483.30	6	27,692,524

SUMMARY OF DITCH AND RESERVOIR FILINGS

FROM DECEMBER 1, 1898, TO DECEMBER 1, 1900.

DIVISION NO. 5

District No.	Number of Ditches	Capacity Claimed in Second-Feet	Number of Reservoirs	Capacity in Cubic Feet
28	2	6.20	None	
36	15	373.87	None	
37	24	387.04	None	
38	18	97.57	2	919,465
39	8	26.52	12	167,049,446
40	26	167.40	15	241,786,980
41	14	71.47	1	52,400,800
42	33	335.50	13	318,742,200
45	7	71.66	None	
50	7	44.65	None	
51	8	156.78	None	
52	5	37.44	None	
53	9	49.00	1	8,771,580
59	32	752.68	1	35,000,000
60	8	60.04	1	87,475,980
61	2	11.00	None	
62	9	130.85	2	8,012,060
63	None		None	
68	1	1.00	None	
Totals	228	2,780.77	48	920,158,451

SUMMARY OF DITCH AND RESERVOIR FILINGS

FROM DECEMBER 1, 1898, TO DECEMBER 1, 1900.

DIVISION NO. 6

District No.	Number of Ditches	Capacity Claimed in Second-Feet	Number of Reservoirs	Capacity in Cubic Feet
43	25	197.03	4	11,412,318
44	5	21.80	None	
54	4	41.25	None	
55	1	15	None	
56	None		None	
57	4	98.80	None	
58	9	36	2	7,808,156
Totals	48	409.88	6	19,220,474

Division No.	Number of Ditches	Capacity Second-Feet	Number of Reservoirs	Capacity in Cubic Feet
1	116	3,363.77	46	48,882,000
2	90	6,302.56	36	1,697,007,341
3	24	312.65	5	980,721,815
4	56	3,483.30	6	27,692,524
5	228	2,780.77	48	920,158,451
6	48	409.88	6	19,220,474
Totals	562	16,652.93	147	3,693,682,605

TABLE

GIVING DITCH DECREES IN DISTRICT NO. 1, AS THEY HAVE BEEN MODIFIED SINCE THE STATEMENT PUBLISHED IN THE "FOURTH BIENNIAL REPORT," PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.

NAME OF DITCH	Source of Appropriation	Date of Appropriation	Cubic feet of water per second of time decreed to each priority	Summation of decrees to each ditch or canal	Cubic feet of water previously appropriated in district	Order of priority in district
Oaks ditch, No. 1	Kiowa creek	April 26, 1866	2			1
Wendling ditch	Killin's spring run	April 1, 1868	5		2	2
Oaks ditch, No. 2	Kiowa creek	May 1, 1868	3		7	3
Hoover ditch	South Platte river	April 20, 1869	15		10	4
*P. H. Parsons ditch	South Platte river	Jan. 1, 1871	4		25	5
*Schultz ditch	South Platte river	April 1, 1871	7		29	6
*Deuel & Snyder ditch	South Platte river	April 2, 1871	13		36	7
*Johnson & Edwards ditch	South Platte river	June 1, 1872	15		49	8
*Hardin ditch	South Platte river	Jan. 1, 1873	8		64	9
*Brown & Pyott ditch	South Platte river	June 1, 1874	8		72	10
Lone Tree ditch and lateral	Lone Tree creek	Sept. 5, 1874	No specified amount.			11
Tetsel ditch	South Platte river	Nov. 15, 1874	17		80	12

TABLE

GIVING DITCH DECREES IN DISTRICT NO. 1, AS THEY HAVE BEEN MODIFIED SINCE THE STATEMENT PUBLISHED IN THE "FOURTH BIENNIAL REPORT," PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.—Continued.

NAME OF DITCH	Source of Appropriation	Date of Appropriation	Cubic feet of water per second of time decreed to each priority	Summation of decrees to each ditch or canal	Cubic feet of water previously appropriated in district	Order of priority in district
*Corona Ranch ditch	South Platte river	June 1, 1875	21	....	97	13
Aux ditch No. 1	Kiowa creek	Sept. 15, 1875	2.50	....	118	14
Illinois ditch	South Platte river	June 1, 1876	27	....	120.50	15
John D. Cornell ditch	Lone Tree creek	May 1, 1877	No specified amount.		....	16
Deitrich ditch No. 1	Kiowa creek	May 1, 1878	2.50	....	147.50	17
Deitrich ditch No. 2	Kiowa creek	Sept. 10, 1879	1.50	....	150	18
Putnam ditch	South Platte river	April 1, 1880	10	....	151.50	19
Fred Bachman ditch No. 2	Kiowa creek	Mar. 20, 1881	5.50	....	161.50	20
Mimmack ditch	Lone Tree ditch	April 1, 1881	1	....	167	21
Weldon Valley ditch	South Platte river	Oct. 26, 1881	165	....	168	22
I. D. Miller ditch	Lone Tree creek	Feb. 1, 1882	1	....	333	23
Putnam ditch	South Platte river	April 26, 1882	30	40	334	24
Beaver ditch	Big Beaver creek	May 1, 1882	44	....	364	25
Mauldin ditch	Running creek	May 12, 1882	1.50	....	408	26

Lone Tree ditch	Lone Tree creek	May 15, 1882	1.50		409.50	27
Platte and Beaver upper ditch	South Platte river	June 20, 1882	50		411	28
Tetsel ditch, first enlargement	South Platte river	July 1, 1882	20	37	461	29
Fred Bachman ditch No. 3	Kiowa creek	July 3, 1882	1		481	30
Platte and Beaver lower ditch	South Platte river	Sept. 4, 1882	38		482	31
Fort Morgan canal	South Platte river	Oct. 18, 1882	323		520	32
George A. Wood ditch	Kiowa creek	April 10, 1883	3		813	33
Hardin ditch	South Platte river	Feb. 21, 1884	28	28	846	34
Duel and Snyder ditch	South Platte river	April 7, 1884	32	32	874	35
Camfield ditch	Crow creek	Dec. 20, 1884	20		906	36
Deitrich ditch No. 3	Kiowa creek	April 2, 1885	1		926	37
Ward ditch	Owl creek	April 25, 1885	2		927	38
Ehrler ditch	Kiowa creek	Mar. 15, 1885	1		929	39
Camfield ditch, first enlargement	Crow creek	Oct. 1, 1885	63	83	930	40
Johnson and Edwards ditch	South Platte river	April 10, 1886	48	48	993	41
McClellan ditch	Lone Tree creek	July 13, 1886	3		1,041	42
Corona Ranch ditch	South Platte river	Nov. 15, 1886	35	35	1,044	43
River Side ditch	South Platte river	Nov. 29, 1886	16		1,079	44
Elbert ditch	Kiowa creek	Feb. 8, 1887	1		1,095	45
Aux ditch No. 2	Kiowa creek	Feb. 12, 1887	1		1,096	46
A. A. Smith ditch	South Platte river	June 18, 1887	20		1,097	47
Farr ditch	Owl creek	July 15, 1887	No specified amount			48
J. B. Cook ditch	Lone Tree creek	July 18, 1887	No specified amount			49
Fahrion ditch	Kiowa creek	Sept. 20, 1887	1		1,117	50
Page and Foster ditch	West Bijou creek	Feb. 10, 1888	8		1,118	51

TABLE

GIVING DITCH DECREES IN DISTRICT NO. 1, AS THEY HAVE BEEN MODIFIED SINCE THE STATEMENT PUBLISHED IN THE "FOURTH BIENNIAL REPORT," PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.—Concluded.

NAME OF DITCH	Source of Appropriation	Date of Appropriation	Cubic feet of water per second of time decreed to each priority	Summation of decrees to each ditch or canal	Cubic feet of water previously appropriated in district	Order of priority in district
Bijou ditch, reservoir and pipe line	West Bijou creek	Feb. 27, 1888	30	----------	1,126	52
Schultz ditch	South Platte river	April 1, 1888	21	21	1,156	53
Mimmack ditch, first enlargement	Lone Tree creek	April 2, 1888	2	3	1,177	54
D. C. Bailey ditch	Kiowa creek	April 3, 1888	5.50	----------	1,179	55
Upper Platte and Beaver ditch, by additional use	South Platte river	April 15, 1888	164	214	1,184.50	56
Lower Platte and Beaver ditch, by additional use	South Platte river	April 15, 1888	284	322	1,348.50	57
Valley ditch	Lone Tree creek	May 8, 1888	1	----------	1,632.50	58
Wadlin and Lunt ditch	Owl creek	Aug. 28, 1888	No specified amount		----------	59
Fort Morgan Land and Reservoir Co. ditch	South Platte river	Oct. 18, 1888	125	----------	1,633.50	60
Brown and Pyott ditch, enlargement	South Platte river	Nov. 1, 1888	31	31	1,758.50	61
Wadlin ditch No. 2	Crow creek	Dec. 1, 1888	135	----------	1,789.50	62
Craven ditch	West Bijou creek	Feb. 10, 1889	1	----------	1,924.50	63
I. D. Miller waste and seepage ditch	Lone Tree creek	June 1, 1889	4.50	----------	1,925.50	64
Gill and Stevens ditch	South Platte river	Sept. 3, 1889	23	----------	1,930	65

P. H. Parsons ditch	South Platte river	Sept. 8, 1889	48	48	1,953	66
Beuck ditch	East Bijou creek	Sept. 15, 1889	22	----------	2,001	67
Kruse and Mauldin ditch	Running creek	Sept. 17, 1889	1.50	----------	2,023	68
Comanche ditch	Comanche creek	Dec. 2, 1889	4	----------	2,024.50	69
Sand Arroya ditch	Sand Arroya creek	Dec. 12, 1889	No specifi	ed amount	----------	70
Marki ditch	Kiowa creek	May 25, 1890	1	----------	2,028.50	71
Bijou reservoir ditch	Bijou creek	July 5, 1891	No specifi	ed amount	----------	72
Bramkamp ditch and reservoir	Deer Trail	Feb. 15, 1892	5	----------	2,029.50	73
Moore ditch and reservoir	Deer Trail	Nov. 6, 1893	No specifi	ed amount	----------	74
				Total	2,034.50	------

TABLE

GIVING RESERVOIR DECREES IN WATER DISTRICT NO. 1, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.

NAME OF RESERVOIR	Source of Appropriation	Date of Appropriation	Amount of Appropriation	Order of priority in district
J. B. Cook reservoir	Lone Tree creek	Dec. 1, 1888	$ 8,000,000 00	1
Bijou reservoir	West Bijou creek	April 27, 1889	10,000,000 00	2
Beuck reservoir	East Bijou creek	Sept. 15, 1889	3,267,000 00	3
Bijou reservoir No. 1	Bijou creek	July 5, 1891	No specified amount	4
Bijou reservoir No. 2	Bijou creek	July 5, 1891	No specified amount	4
Bijou reservoir No. 3	Bijou creek	July 5, 1891	No specified amount	4
Bijou reservoir No. 4	Bijou creek	July 5, 1891	No specified amount	4
Bijou reservoir No. 5	Bijou creek	July 5, 1891	No specified amount	4
Bijou reservoir No. 6	Bijou creek	July 5, 1891	No specified amount	4
Drury reservoir No. 1 and ditches	Crow creek	Oct. 6, 1891	No specified amount	5
Owl Creek reservoir and ditches	Owl creek	Oct. 14, 1891	$28,000,000 00	6
Wadlin reservoir	Crow creek	Dec. 19, 1891	44,000,000 00	7
Drury reservoir No. 2 and ditches	Crow creek	Feb. 3, 1892	No specified amount	8
Bramkamp reservoir	Deer Trail creek	Feb. 15, 1892	$ 5,197,000 00	9

Fort Morgan Land and Reservoir Co.'s reservoir No. 1	South Platte river	Sept. 1, 1892	No specified amount	10
Fort Morgan Land and Reservoir Co.'s reservoir No. 2	South Platte river	Sept. 25, 1892	No specified amount	11
Fort Morgan Land and Reservoir Co.'s reservoir No. 3	South Platte river	Oct. 10, 1892	No specified amount	12
Drury reservoir and ditches No. 3	Crow creek	May 13, 1893	No specified amount	13
Moore reservoir	Deer Trail creek	Nov. 6, 1893	No specified amount	14
Mary Lawless reservoir	West Bijou creek	Dec. 23, 1893	No specified amount	15

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 2,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet of water previously appropriated in district	Order of priority in district
Brantner ditch	South Platte	April 1, 1860	29.77			1
Platteville Irrigating and Milling Co.'s ditch	South Platte	July 1, 1862	47.88		29.77	2
Farmers' and Gardeners' ditch	South Platte	Mar. 15, 1863	13.71		77.65	3
Brantner ditch, first enlargement	South Platte	May 1, 1863	5.93	35.70	91.36	4
Lupton Bottom ditch	South Platte	May 15, 1863	47.70		97.29	5
Brighton ditch	South Platte	Dec. 1, 1863	22.22		144.99	6
Duggan ditch	South Platte	April 1, 1864	56.85		167.21	7
Fulton ditch	South Platte	May 1, 1865	79.70		224.06	8
Jay Thomas ditch	South Platte	June 1, 1865	104.35		303.76	9
Farmers' Independent ditch	South Platte	Nov. 20, 1865	61.60		408.11	10
Meadow Island ditch, No. 1	South Platte	May 1, 1866	26.23		469.71	11
Meadow Island ditch	South Platte	May 3, 1866	57.83		495.94	12
Hewes & Cook ditch	South Platte	May 5, 1866	27.45		553.77	13
Hodgson ditch	South Platte	April 26, 1869	12.82		581.22	14
Lower Latham ditch	South Platte	May 12, 1869	20.40		594.04	15

Getz ditch	South Platte	May 15, 1869	5.17	----------	614.44	16
Section No. 3 ditch	South Platte	Mar. 10, 1870	26.88	----------	619.61	17
Loomis ditch	Not given	Dec. 8, 1870	20.70	----------	646.49	18
Platteville Irrigating and Milling Co.'s ditch, first enlargement	South Platte	Jan. 1, 1871	5.25	53.13	667.19	19
Elwood ditch	South Platte	Mar. 10, 1871	37.60	----------	672.44	20
St. Louis Colony ditch, No. 1	South Platte	April 20, 1871	29.28	----------	710.04	21
Patterson ditch	South Platte	May 1, 1871	19.92	----------	739.32	22
Hewes & Cook ditch, first enlargement	South Platte	Aug. 10, 1871	71.12	98.57	759.24	23
Highland ditch	South Platte	Oct. 1, 1871	64.40	----------	830.36	24
Evans ditch, No. 2	South Platte	Oct. 5, 1871	177.07	----------	894.76	25
Brighton ditch, first enlargement	South Platte	Nov. 1, 1871	22.58	44.80	1,071.83	26
Brantner ditch, second enlargement	South Platte	July 1, 1872	12.18	47.88	1,094.41	27
Section No. 3 ditch, first enlargement	South Platte	Mar. 15, 1873	30.83	57.71	1,106.59	28
Clear Spring ditch	Not given	April 15, 1873	26.33	----------	1,137.42	29
Frederick Brothers' ditch	South Platte	April 20, 1873	16.32	----------	1,163.75	30
Lupton Bottom ditch, first enlargement	South Platte	Sept. 15, 1873	92.87	140.57	1,180.07	31
Big Bend ditch	South Platte	Sept. 26, 1873	20.88	----------	1,272.94	32
Platteville Irrigating and Milling Co.'s ditch, 2d enlargement	South Platte	Oct. 15, 1873	94.25	147.38	1,293.82	33
Farmers' and Gardeners' ditch, first enlargement	South Platte	April 1, 1874	10.28	23.99	1,388.07	34
Theodore Wheeler ditch	South Platte	April 15, 1874	13.45	----------	1,398.35	35
Union ditch	South Platte	Nov. 5, 1874	100	----------	1,411.80	36
Lower Latham ditch, first enlargement	South Platte	Dec. 12, 1874	35.77	56.17	1,511.80	37
Elwood ditch, first enlargement	South Platte	April 1, 1875	80.48	118.08	1,547.57	38
Theodore Wheeler ditch, first enlargement	South Platte	June 1, 1875	6.68	20.13	1,628.05	39
Evans ditch No. 2, first enlargement	South Platte	Nov. 20, 1875	226.98	404.05	1,634.73	40

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 2—Concluded.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet of water previously appropriated in district	Order of priority in district
Meadow Island ditch, first enlargement	South Platte	April 10, 1876	8.33	66.16	1,861.71	41
Theodore Wheeler ditch, second enlargement	South Platte	May 10, 1876	21.42	41.55	1,870.04	42
Fulton ditch, first enlargement	South Platte	July 8, 1876	74.25	153.95	1,891.46	43
Mayfield ditch	South Platte	Oct. 15, 1876	15.67	----------	1,965.71	44
Farmers' Independent ditch, first enlargement	South Platte	Nov. 20, 1876	85.40	147.00	1,981.38	45
Lower Latham ditch, second enlargement	South Platte	Nov. 14, 1877	97.68	153.85	2,066.78	46
Beeman ditch	South Platte	Dec. 19, 1877	127.00	----------	2,164.46	47
Wyatt ditch	South Platte	Mar. 12, 1878	23.63	----------	2,291.46	48
Buckers ditch	South Platte	July 8, 1879	121.87	----------	2,315.09	49
Farmers' Independent ditch, second enlargement	South Platte	Nov. 1, 1879	373.00	520.00	2,436.96	50
Fulton ditch, second enlargement	South Platte	Nov. 5, 1879	50.23	204.18	2,809.96	51
Brantner ditch, third enlargement	South Platte	Jan. 15, 1881	63.30	111.18	2,860.19	52
Lower Latham ditch, third enlargement	South Platte	Oct. 24, 1881	133.88	287.73	2,923.49	53
Union ditch, first enlargement	South Platte	Nov. 2, 1881	84.03	184.03	3,057.37	54
Side Hill ditch	South Platte	April 29, 1882	94.80	----------	3,141.40	55
Fulton ditch, third enlargement	South Platte	Nov. 1, 1882	244.62	448.80	3,236.20	56

Burlington ditch	South Platte	Nov. 20, 1885	350	....	3,675	57
				Total	4,025	

WATER APPROPRIATED FROM DRY CREEK.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet of water previously appropriated in district	Order of priority in district
Jones ditch	Dry creek	1883	Not stated	....	....	1
German ditch	Dry creek	1885	Not stated	....	....	2
Calkins ditch	Dry creek	1885	Not stated	....	....	3
Whipple ditch	Dry creek	....	1.00	....	....	4

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 3,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF DITCH, CANAL, OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet of water previously appropriated in district	Order of priority in district
Yeager ditch	Cache la Poudre	June 1, 1860	24.80	----------	000.00	1
Ditch of Watrous, Whedbee & Secord	Cache la Poudre	June 1, 1861	1.44	----------	24.80	2
Dry Creek ditch	Cache la Poudre	June 10, 1861	11.67	----------	26.24	3
Pleasant Valley and Lake canal	Cache la Poudre	Sept. 1, 1861	10.97	----------	37.91	4
Pioneer ditch	Cache la Poudre	Mar. 1, 1862	12.92	----------	48.88	5
Boyd & Freeman ditch	Cache la Poudre	Mar. 15, 1862	66.05	----------	61.80	6
Whitney irrigating ditch	Cache la Poudre	Sept. 1, 1862	48.23	----------	127.85	7
Yeager ditch (upper branch), first enlargement	Cache la Poudre	June 1, 1863	8.70	33.50	176.08	8
B. H. Eaton ditch	Cache la Poudre	April 1, 1864	29.10	----------	184.78	9
Larimer and Weld irrigating canal	Cache la Poudre	June 1, 1864	3.00	----------	213.88	10
Pleasant Valley and Lake canal, first enlargement	Cache la Poudre	June 10, 1864	29.63	40.60	216.88	11
Pioneer ditch, first enlargement	Cache la Poudre	Sept. 15, 1864	16.67	29.59	246.51	12
John G. Coy ditch	Cache la Poudre	April 10, 1865	31.63	----------	263.18	13
Ditch of John R. Brown	Cache la Poudre	May 1, 1865	8.00	----------	294.81	14
Box Elder ditch	Cache la Poudre	Mar. 1, 1866	32.50	----------	302.81	15

Chamberlin private ditch	Cache la Poudre	April 1, 1866	14.83	....	335.31	16
Taylor & Gill ditch	Cache la Poudre	April 15, 1866	18.48	....	350.14	17
B. H. Eaton ditch, first enlargement	Cache la Poudre	June 1, 1866	3.33	32.43	368.62	18
Ditch of Watrous, Whedbee & Secord, first enlargement	Cache la Poudre	July 1, 1866	4.33	5.77	371.95	19
Boyd & Freeman ditch, first enlargement	Cache la Poudre	July 15, 1866	9	75.05	376.28	20
Larimer and Weld irrigating canal, first enlargement	Cache la Poudre	April 1, 1867	16.67	19.67	385.28	21
Mason & Hottell mill race	Cache la Poudre	April 15, 1867	93.07	....	401.95	22
Box Elder ditch, first enlargement	Cache la Poudre	May 25, 1867	8.33	40.83	495.02	23
Ditch of Wm. R. Jones	Cache la Poudre	Sept. 1, 1867	15.52	....	503.35	24
Josh Ames irrigating ditch	Cache la Poudre	Oct. 1, 1867	35.92	....	518.87	25
Martin Calloway ditch	Box Elder creek	Mar. 1, 1868	15.22	....	554.79	26
Ditch of Noah Bristol and Philo Bristol (lower)	Box Elder creek	Mar. 10, 1868	15.22	....	570.01	27
Canon Canal Co. ditch	Cache la Poudre	Mar. 15, 1868	8.60	....	585.23	28
Ditch of Watrous, Whedbee & Secord, second enlargement	Cache la Poudre	June 1, 1868	4.33	10.10	593.83	29
Box Elder ditch, second enlargement	Cache la Poudre	July 1, 1868	11,93	52.76	598.16	30
Irrigating Ditch Co	Cache la Poudre	May 1, 1869	60.08	....	610.09	31
Fort Collins irrigating canal	Cache la Poudre	June 1, 1869	1.67	....	672.17	32
New Mercer Ditch Co	Cache la Poudre	Sept. 1, 1869	4.17	....	673.84	33
Ditch of Noah Bristol and Philo Bristol (upper)	Box Elder creek	Mar. 1, 1870	14.83	....	678.01	34
Canal No. 3	Cache la Poudre	April 1, 1870	52	....	692.84	35
Dry Creek ditch, first enlargement	Cache la Poudre	Oct. 21, 1870	14.42	26.09	744.84	36
Cache la Poudre irrigating Co.'s ditch	Cache la Poudre	Oct. 25, 1870	110	....	759.26	37
Fort Collins irrigating canal, first enlargement	Cache la Poudre	April 1, 1871	31.66	33.33	869.26	38
Burnham & Emerson ditch	Lone Pine creek	April 1, 1871	26	....	900.92	39
Wm. Calloway ditch No. 1	North fork Cache la Poudre	May 1, 1871	21.05	....	926.92	40

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 3—Continued.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet of water previously appropriated in district	Order of priority in district
Mill Power ditch	Cache la Poudre	July 1, 1871	160		947.97	41
Fletcher ditch	Cache la Poudre	Sept. 1, 1871	63.16		1107.97	42
Whitney irrigating ditch, first enlargement	Cache la Poudre	Sept. 10, 1871	12.95	61.18	1171.13	43
Cache la Poudre Company's ditch, first enlargement	Cache la Poudre	Sept. 15, 1871	170	200.80	1184.08	44
Larimer and Weld irrigating canal, second enlargement	Cache la Poudre	Sept. 20, 1871	75	94.67	1354.08	45
Canal No. 3, first enlargement	Cache la Poudre	Oct. 1, 1871	41	93	1429.08	46
New Mercer Ditch Co., first enlargement	Cache la Poudre	Oct. 10, 1871	8.33	12.50	1470.08	47
Chaffee irrigating ditch	Cache la Poudre	Mar. 15, 1872	22.38		1478.41	48
New Mercer Ditch Co., second enlargement	Cache la Poudre	July 1, 1872	15	27.50	1500.79	49
Canal No. 3, second enlargement	Cache la Poudre	July 15, 1872	63.13	156.13	1515.79	50
Pleasant Valley and Lake canal, second enlargement	Cache la Poudre	July 19, 1872	16.50	57.10	1578.92	51
Fort Collins irrigating ditch, second enlargement	Cache la Poudre	July 20, 1872	33.33	66.66	1595.42	52
B. H. Eaton ditch, second enlargement	Cache la Poudre	July 25, 1872	9.26	41.69	1628.75	53
Lake canal	Cache la Poudre	Nov. 1, 1872	158.35		1638.01	54
Ditch of Wm. S. Taylor	Cache la Poudre	Mar. 15, 1873	28.60		1796.36	55
Canon Canal Company ditch, first enlargement	Cache la Poudre	Mar. 20, 1873	48.88	57.48	1824.96	56
Larimer County Canal, No. 2 irrigating ditch	Cache la Poudre	April 1, 1873	175		1873.84	57

Cache la Poudre Irrigating Ditch Co., first enlargement	Cache la Poudre	May 1, 1873	20.12	82.50	2,048.84	58
Canal No. 3, third enlargement	Cache la Poudre	May 15, 1873	16.65	172.80	2,069.26	59
Ditch of Aquilla Morgan	N. fork Cache la Poudre	July 1, 1873	17.65		2,085.91	60
Brown ditch No. 1	Fish creek	July 1, 1873	9.38		2,103.56	61
Boyd & Freeman ditch, second enlargement	Cache la Poudre	Aug. 1, 1873	24.23	99.28	2,112.94	62
Brown ditch No. 2	Fish Creek	Aug. 15, 1873	3.32		2,137.17	63
Strudevant ditch No. 1	Box Elder Creek	Aug. 15, 1873	10.66		2,140.49	64
Strudevant ditch No. 2	Box Elder Creek	Aug. 20, 1873	10.66		2,151.15	65
Fort Collins Irrigating ditch, third enlargement	Cache la Poudre	Sept. 1, 1873	63.28	129.94	2,161.81	66
Dry Creek ditch, second enlargement	Cache la Poudre	Sept. 15, 1873	12.13	38.22	2,225.09	67
Vandewark ditch	Cache la Poudre	May 1, 1874	10.17		2,237.22	68
Brown ditch No. 3	Fish creek	May 15, 1874	3.32		2,247.39	69
Mitchell and Weymouth ditch No. 1	Lone Pine creek	May 15, 1874	17.35		2,250.71	70
Ditch of Andrew Boyd, et al	Fish creek	Nov. 1, 1874	15.03		2,268.06	71
Cache la Poudre Irrigating Co.'s ditch, second enlargement	Cache la Poudre	Nov. 10, 1874	184.00	464.00	2,283.09	72
Larimer and Weld Irrigating canal, third enlargement	Cache la Poudre	Jan. 15, 1875	51.33	149.00	2,467.09	73
Wm. Calloway ditch No. 2	N. Fork Cache la Poudre	Jan. 28, 1875	14.16		2,521.42	74
Witzler ditch, et al	Lone Pine creek	Mar. 22, 1875	10.36		2,535.58	75
Warren Lake reservoir	Priority No. 56	April 15, 1875				76
Brown ditch No. 4	Fish creek	May 1, 1875	6.72		2,545.94	77
Kitchell & Ladd ditch	Cache la Poudre	Oct. 1, 1875	2.95		2,552.66	78
Brown ditch No. 5	Fish creek	June 1, 1876	6.72		2,555.61	79
Brown ditch No. 6	Fish creek	June 1, 1876	6.72		2,562.33	80
Witzler ditch, et al., first enlargement	Lone Pine creek	Mar. 1, 1877	3.00	13.36	2,569.05	81
Brown ditch No. 7	Fish creek	June 1, 1877	2.85		2,572.05	82

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 3—Concluded.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet of water previously appropriated in district	Order of priority in district
Cache la Poudre Irrigating Co.'s ditch, third enlargement	Cache la Poudre	Sept. 15, 1877	121.00	585.00	2,574.90	83
Ditch of Henry Smith, et al	Cache la Poudre	April 1, 1878	7.23		2,695.90	84
Abram Washburn ditch No. 1	Cache la Poudre	April 15, 1878	9.57		2,703.13	85
Roberts ditch No. 1	N. fork Cache la Poudre	April 15, 1878	5.76		2,712.70	86
Box Elder Reservoir Co.'s ditch	Box Elder creek	June 18, 1878	17.50		2,718.37	87
Larimer and Weld Irrigating canal, fourth enlargement	Cache la Poudre	Sept. —, 1878	571.00	720.00	2,735.87	88
Carter Cotton millrace	Cache la Poudre	April 1, 1879	127.30		3,306.87	89
Ditch of Abram Washburn, No. 2	Cache la Poudre	April 15, 1879	15.43		3,434.17	90
Dry Creek ditch, third enlargement	Cache la Poudre	July 15, 1879	12.70	50.92	3,449.60	91
Pleasant Valley and Lake canal, third enlargement	Cache la Poudre	Aug. 18, 1879	80.83	137.93	3,462.30	92
Ditch of John McKay, et al	N. fork Cache la Poudre	Sept. 1, 1879	3.40		3,543.13	93
Fisk Ditch No. 2	N. fork Cache la Poudre	Dec. 1, 1879	10.28		3,546.53	94
Carter Cotton millrace, first enlargement	Cache la Poudre	Dec. 31, 1879	37.17	164.47	3,556.81	95
Mitchell & Weymouth Ditch No. 2	Lone Pine creek	Jan. 19, 1880	16.27		3,593.98	96
North Poudre Land, Canal and Reservoir Co.	N. fork Cache la Poudre	Feb. 1, 1880	315.00		3,610.25	97
New Mercer Ditch Co., third enlargement	Cache la Poudre	Feb. 15, 1880	136.00	163.50	3,925.25	98
Chase ditch	N. fork Cache la Poudre	July 7, 1880	21.40		4,061.25	99

Larimer County ditch	Cache la Pondre	April 25, 1881	469.80	----------	4,082.65	100
Eagle Ranch ditch	North Fork Cache la Poudre	Oct. 1, 1881	5.02	----------	4,552.45	101
Pleasant Valley and Lake canal, fourth enlargement	Cache la Poudre	Oct. 10, 1881	----------	----------	----------	102
Emerson Bros.' ditch	Lone Pine creek	April 15, 1882	29.88	----------	4,602.65	103
Roberts ditch No. 1, first enlargement	North Fork Cache la Poudre	Sept. 1, 1882	4.09	----------	4,632.53	104
Baker and Ogilvie Irrigating ditch	Cache la Poudre	July 1, 1881	57.60	----------	4 636.62	105
				Total	4,693.62	

STATEMENT

CONCERNING RESERVOIRS IN WATER DISTRICT NO. 3, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPIES OF DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF RESERVOIR	Source of Supply	Date of appropriation	Amount of appropriation in cubic feet
Larimer County, Nos. 2, 3 and 4	Cache la Poudre	April 25, 1881	880,064,500
Chamber's Lake reservoir	Cache la Poudre	July 12, 1882	134,176,800
Windsor reservoir	Cache la Poudre	July 8, 1890	510,000,000
Windsor reservoir	Cache la Poudre	August, 1894	
Cache la Poudre reservoir	Cache la Poudre	March 12, 1892	374,000,000
Cache la Poudre reservoir	Cache la Poudre	August, 1894	
Larimer County, Nos. 1 and 5	Cache la Poudre	1893	381,710,020

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 4,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS OF WATER IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet of water previously appropriated in district	Order of priority in district
Osborne & Caywood ditch	Little Thompson creek	June 1, 1861	3.12			1
Big Thompson ditch	Big Thompson creek	Nov. 10, 1861	96.50		3.12	2
Big Thompson Ditch and Manufacturing Co.'s ditch	Big Thompson creek	April 1, 1863	34.02		99.62	3
Mariano ditch	Big Thompson creek	May 1, 1863	3.12		133.64	4
Big Thompson Ditch and Manufacturing Co.'s ditch, first enlargement	Big Thompson creek	May 1, 1864	37.01	71.03	136.76	5
Farmers' Irrigating canal	Big Thompson creek	May 1, 1864	5.72		173.77	
Big Thompson Irrigating ditch	Big Thompson creek	Feb. 25, 1865	78		179.49	6
Loveland and Greeley canal	Big Thompson creek	Oct. 20, 1865	18.56		257.49	7
Loveland and Greeley canal (branch)	Big Thompson creek	Nov. 1, 1865	8.36	26.92	276.05	8
Big Thompson and Platte River ditch	Big Thompson creek	Nov. 18, 1865	35		284.41	9
Rist & Goss ditch	Big Thompson creek	Mar. 20, 1866	6.41		319.41	10
W. R. Blower No. 2 ditch	Little Thompson creek	May 1, 1866	6.24		325.82	11
Hill & Brush ditch	Big Thompson creek	June 30, 1866	61.80		332.06	12
Big Thompson Ditch and Manufacturing Co.'s ditch, second enlargement	Big Thompson creek	Mar. 1, 1867	65.47	136.50	393.86	13

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 4—Concluded.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet of water previously appropriated in district	Order of priority in district
Culver & Mahoney ditch	Little Thompson creek	April 15, 1867	19.50	----------	459.33	14
Loveland and Greeley canal, first enlargement	Big Thompson creek	June 1, 1867	12.06	38.98	478.83	15
Lykens ditch	Little Thompson creek	May 1, 1868	1.17	----------	490.89	16
Farmers' Irrigating canal, first enlargement	Big Thompson creek	June 1, 1868	2.60	8.32	492.06	17
W. R. Blower ditch, No, 1	Little Thompson creek	April 1, 1869	27.30	----------	494.66	18
Lykens ditch, first enlargement	Little Thompson creek	May 3, 1869	4.03	5.20	521.96	19
Jim Elgin ditch	Little Thompson creek	May 31, 1869	0.18	----------	525.99	20
Loveland and Greeley canal, second enlargement	Big Thompson creek	Oct. 20, 1870	39.04	78.02	526.17	21
Loudon Irrigating canal	Big Thompson creek	Oct. 1, 1871	40	----------	565.21	22
Jim Elgin ditch, first enlargement	Little Thompson creek	April 15, 1872	3.46	3.64	605.21	23
Big Thompson Ditch and Manufacturing Co.'s ditch, third enlargement	Big Thompson creek	May 1, 1872	9.75	146.25	608.67	24
George Rist ditch	Big Thompson creek	May 1, 1873	195	----------	618.42	25
Loveland and Greeley canal, third enlargement	Big Thompson creek	June 23, 1873	19.93	97.95	813.42	26
Loveland and Greeley canal, fourth enlargement	Big Thompson creek	Oct. 25, 1873	35.50	133.45	833.35	27
Kirchner ditch	Buckhorn creek	June 1, 1874	6.81	----------	868.85	28
Perkins ditch	Buckhorn creek	June 15, 1874	2.60	----------	875.66	29
Hillsborough ditch	Big Thompson creek	Oct. 15, 1874	8.25	----------	878.26	30
Meining ditch	Little Thompson creek	Dec. 20, 1874	1.40	----------	886.51	31

Osborne & Caywood ditch, first enlargement	Little Thompson creek	Mar. 10, 1875	16.64	19.76	887.91	32
Rist & Goss ditch	Big Thompson creek	April 15, 1875	80.07	86.48	904.55	33
Culver & Mahoney ditch, first enlargement	Little Thompson creek	April 30, 1875	19.50	39.00	984.62	34
Boulder and Larimer County Irrigating and Manufacturing ditch and reservoir	Little Thompson creek	June 30, 1875	27.20		1,004.12	35
W. R. Blower ditch No. 1, first enlargement	Little Thompson creek	May 1, 1876	17.63	44.93	1,031.32	36
Big Thompson and Platte River ditch, first enlargement	Big Thompson creek	May 15, 1876	86.18	121.18	1,048.95	37
Eagle ditch	Little Thompson creek	Mar. 1, 1877	15.60		1,135.13	38
Boulder and Larimer County Irrigating and Manufacturing ditch and reservoir, first enlargement	Little Thompson creek	May 20, 1877	39.52	66.72	1,150.73	39
Loudon Irrigating canal, first enlargement	Big Thompson creek	Nov. 1, 1877	154.30	194.30	1,190.25	40
Handy ditch	Big Thompson creek	Feb. 28, 1878	31.20		1,344.55	41
Hillsboro ditch, first enlargement	Big Thompson creek	April 15, 1878	99.46	107.71	1,375.75	42
Farmers' Irrigating canal, second enlargement	Big Thompson creek	Aug. 1, 1878	54.08	62.40	1,475.21	43
Loveland and Greeley canal, fifth enlargement	Big Thompson creek	Nov. 1, 1878	15.20	148.65	1,529.29	44
Supply Lateral ditch	Little Thompson creek	Nov. 30, 1878	35.57		1,544.49	45
Neville ditch	Buckhorn creek	April 25, 1879	3.12		1,580.06	46
Perkins ditch, first enlargement	Buckhorn creek	June 15, 1879	.50	3.10	1,583.18	47
Buffum ditch	Buckhorn creek	June 28, 1879	2.60		1,583.68	48
South Side ditch	Big Thompson creek	Nov. 7, 1880	50.30		1,586.28	49
Handy ditch, first enlargement	Big Thompson creek	Dec. 15, 1880	141.23	172.43	1,636.58	50
Loveland and Greeley canal, sixth enlargement	Big Thompson creek	April 1, 1881	297.44	446.09	1,777.81	51
Perkins ditch, second enlargement	Buckhorn creek	June 9, 1881	4.47	7.57	2,075.25	52
Home Supply ditch	Big Thompson creek	July 15, 1881	278.84		2,079.72	53
Hillsboro ditch, second enlargement	Big Thompson creek	Oct. 6, 1881	45.69	153.40	2,358.56	54
Loudon Irrigating canal, second enlargement	Big Thompson creek	Sept. 17, 1883	123.48	317.78	2,404.25	55
Badger ditch	Dry creek	April 25, 1884	8.83		2,527.73	56

STATEMENT CONCERNING RESERVOIRS IN WATER DISTRICT NO. 4,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS OF WATER IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Amount of appropriation	Order of priority in district
Rist reservoir	Big Thompson creek	Sept. 15, 1874	5,210,865	1
Mariano reservoir	Big Thompson creek	Oct. 1, 1875	180,865,000	2
Bennett's reservoir	St. Vrain creek and Little Thompson creek	Feb. 25, 1880	1,267,800	3
Big Thompson reservoir	Big Thompson creek	May 18, 1881	44,000,000	4
Farwell reservoir	Big Thompson creek	Aug. 31, 1881	4,000,000,000	5
Loudon reservoir	Big Thompson creek	Feb. 24, 1883	50,000,000	6

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 5,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS OF WATER IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
Hayseed ditch	St. Vrain creek	Jan. 1, 1860	41.54	....	....	1
Claim of James R. Mason	St. Vrain creek	July 30, 1860	5.45	....	41.54	2
Cochran ditch	Left Hand creek	Sept. 1, 1860	.32	....	46.99	3
N. W. M. L. Ins. Co.'s claim	Left Hand creek	Dec. 31, 1861	3.96	....	47.31	4
Beckwith ditch	St. Vrain creek	Mar. 8, 1861	14.21	....	51.27	5
Bonus ditch	St. Vrain creek	Mar. 30, 1861	12.73	....	65.48	6
Hornbaker ditch	Left Hand creek	May 15, 1861	3.88	....	78.21	7
Bacon's appropriation	St. Vrain creek	June 1, 1861	37.37	....	82.09	8
Cushman ditch	St. Vrain creek	June 20, 1861	13.45	....	119.46	9
Chapman & McCaslin ditch	St. Vrain creek	Mar. 10, 1862	98.13	....	132.91	10
Pella ditch	St. Vrain creek	Mar. 20, 1862	2.02	....	231.04	11
True & Webster ditch	St. Vrain creek	April 1, 1862	10.50	....	233.06	12
Dickens' private ditch	St. Vrain creek	April 15, 1862	15.47	....	243.56	13
Clough & True ditch	St. Vrain creek	April 15, 1862	9.11	....		

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 5—Continued.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second and previously appropriated in district	Order of priority in district
Montgomery private ditch	St. Vrain creek	May 15, 1862	3.96	....	268.14	14
Williamson & Cavey ditch	Left Hand creek	May 31, 1862	2.68	....	272.10	15
Smead ditch	St. Vrain creek	Oct. 1, 1862	16.27	....	274.78	16
Clough's private ditch	St. Vrain creek	April 15, 1863	10.50	....	291.05	17
Runyan ditch	St. Vrain creek	May 1, 1863	10.80	....		
Williamson & Cavey ditch, first enlargement	Left Hand creek	May 1, 1863	4.50	7.18	301.55	18
Holland ditch	Left Hand creek	May 1, 1863	....	....		
South Flat ditch	St. Vrain creek	May 15, 1863	71.43	....	316.85	19
Bader No. 2 ditch	Left Hand creek	May 31, 1863	1.46	....	388.28	20
Farmers' ditch	Left Hand creek	June 1, 1863	1.63	....	389.74	21
Left Hand	St. Vrain creek	June 1, 1863	40.77	....		
Baum & Goyn ditch	Left Hand creek	Sept. 26, 1863	3.96	....	432.14	22
St. Vrain & Gold Hill ditch	St. Vrain creek	Oct. 25, 1863	22.85	....	436.10	23
Hager's Meadow claim	St. Vrain creek	Jan. 1, 1864	2.66	....	458.95	24
N. W. M. L. Insurance Company's claim	St. Vrain creek	Jan. 1, 1864	5.72	....		
L. H. Dickson's appropriation	St. Vrain creek	Feb. 28, 1864	9.13	....	467.33	25
Coffman ditch	St. Vrain creek	May 30, 1864	3.96	....	476.46	26
Bader No. 1 ditch	Left Hand creek	May 31, 1864	9.16	....	480.42	27

Island ditch	St. Vrain creek	June 15, 1864	4.52		489.58	28
Zweck & Turner ditch	St. Vrain creek	June 30, 1864	82.61		494.10	29
Hornbaker ditch, first enlargement	Left Hand creek	July 15, 1864	1.70	5.58	576.71	30
Williams & Cavey ditch, second enlargement	Left Hand creek	May 1, 1865	6.80	13.98	578.41	31
Longmont Supply ditch	St. Vrain creek	May 1, 1865	53.37			
Bonus ditch, first enlargement	St. Vrain creek	May 30, 1865	10.50	23.23	638.58	32
St. Vrain and Palmerton ditch	St. Vrain creek	May 31, 1865	32.35		649.08	33
Altona ditch	Left Hand creek	May 31, 1865	2.01			
Hornbaker ditch, second enlargement	Left Hand creek	June 1, 1865	18.66	24.24	683.44	34
Ni-Wot ditch	St. Vrain creek	June 1, 1865	29.24			
Baker & Weese ditch	St. Vrain creek	June 1, 1865	2.80			
Farmers' ditch, first enlargement	Left Hand creek	June 15, 1865	2.03	3.66	734.14	35
Goss Private ditch No. 1	St. Vrain creek	June 30, 1865	25.11		736.17	36
Goss Private ditch No. 2	St. Vrain creek	June 30, 1865	4.40			
Webster & McCaslin ditch	St. Vrain creek	July 5, 1865	13.23		765.68	37
Denio & Taylor ditch	St. Vrain creek	July 15, 1865	22.62		778.81	38
Weese Private ditch	St. Vrain creek	Sept. 1, 1865	3.96		801.53	39
Coffman ditch, first enlargement	St. Vrain creek	Mar. 20, 1866	9.72	13.68	805.49	40
Holland ditch, first enlargement	Left Hand creek	May 1, 1866		1.28	815.21	41
St. Vrain and Palmerton ditch, first enlargement	St. Vrain creek	May 31, 1866	47.70	80.05	816.49	42
Coffin-Davis ditch	St. Vrain creek	June 1, 1866			864.19	43
Oligarchy ditch	St. Vrain creek	June 1, 1866	43.95			
Cochran ditch, first enlargement	Left Hand creek	June 15, 1866	8.28	8.60	908.14	44
Table Mountain ditch	Left Hand creek	June 25, 1866	15.30		916.42	45
Davis & Downing ditch	St. Vrain creek	Nov. 1, 1866				46

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 5—Continued.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
Coffman ditch, second enlargement	St. Vrain creek	Mar. 1, 1867	.89	14.57	931.72	47
Davis & Downing ditch, first enlargement	St. Vrain creek	May 1, 1867	6.07	----------	932.61	48
Baum & Goyn ditch, first enlargement	Left Hand creek	May 1, 1867	6.78	10.74		
Pella ditch, first enlargement	St. Vrain creek	May 10, 1867	17	19.02	945.46	49
Peck & Metcalf ditch	Dry creek No. 2	May 15, 1867	3.57	----------	962.46	50
Way ditch	Left Hand creek	May 1, 1868	4.20	----------	966.03	51
James ditch	St. Vrain creek	June 30, 1868	8.59	----------	970.23	52
Rough and Ready ditch	St. Vrain creek	Mar. 13, 1869	41.67	----------	978.82	53
Nelson ditch	Dry creek	April 1, 1869	.50	----------	1,020.49	54
Ni-Wot ditch, first enlargement	St. Vrain creek	June 1, 1869	6.72	35.96	1,020.99	55
Davis & Downing ditch, second enlargement	St. Vrain creek	Mar. 15, 1870	8.73	14.80	1,027.71	56
Bader No. 2 ditch, first enlargement	Left Hand creek	Mar. 15, 1870	6.72	8.18		
Toll Gate ditch	Left Hand creek	April 1, 1870	2.63	----------	1,043.16	57
Left Hand ditch, first enlargement	St. Vrain creek	June 1, 1870	685.23	726	1,045.79	58
Farmers' ditch, second enlargement	Left Hand creek	Nov. 1, 1870	11.61	15.27	1,731.02	59
Oligarchy ditch, first enlargement	St. Vrain creek	Dec. 1, 1870	98.65	142.60	1,742.63	60
Star ditch	Left Hand creek	April 1, 1871	25.68	----------	1,841.28	61

Crocker ditch	Left Hand creek	May 1, 1871	3.83	....	1,866.96	62
Swede ditch	St. Vrain creek	May 1, 1871	15.40	....		
Coffins-Davis ditch, first enlargement	St. Vrain creek	June 1, 1871	....	27.05	1,886.19	63
Bear & McCorey ditch	Dry creek	June 1, 1871	.70	....		
Highland ditch	St. Vrain creek	Nov. 30, 1871	205.46	....	1,913.94	64
James ditch, first enlargement	St. Vrain creek	Dec. 30, 1871	5.97	14.56	2,119.40	65
Oligarchy ditch, second enlargement	St. Vrain creek	Mar. 1, 1872	36.84	179.44	2,125.37	66
Last Chance ditch	St. Vrain creek	Mar. 15, 1872	96.94	....	2,162.21	67
Crocker ditch, first enlargement	Left Hand creek	May 1, 1872	14.98	18.81	2,259.15	68
Nelson ditch, first enlargement	Dry creek	May 10, 1872	.15	.65	2,274.13	69
Spring Creek ditch	St. Vrain creek	Jan. 1, 1872	1.70	....	2,274.28	70
Swede ditch, first enlargement	St. Vrain creek	Mar. 1, 1873	9.15	24.55	2,275.98	71
Rough and Ready ditch, first enlargement	St. Vrain creek	Mar. 4, 1873	41.67	83.34	2,285.13	72
Johnson ditch	Left Hand creek	April 1, 1873	8.55	....	2,326.80	73
Pella ditch, second enlargement	St. Vrain creek	June 1, 1873	23.62	42.64	2,335.35	74
Denio & Taylor ditch, first enlargement	St. Vrain creek	Oct. 15, 1873	6.78	29.40	2,358.97	75
Holland ditch, second enlargement	Left Hand creek	Oct. 21, 1873	69.40	70.68	2,365.75	76
Oligarchy ditch, third enlargement	St. Vrain creek	April 1, 1874	58.07	237.51	2,435.15	77
Lake ditch	Left Hand creek	April 15, 1874	8.92	....	2,493.22	78
Table Mountain ditch, first enlargement	Left Hand creek	April 15, 1874	26.43	41.73		
Toll Gate ditch, first enlargement	Left Hand creek	May 1, 1874	2.72	5.35	2,528.57	79
Davis & Downing ditch, third enlargement	St Vrain creek	May 1, 1874	....	14.80		
Nelson ditch, second enlargement	Dry creek	May 20, 1874	.55	1.20	2,531.29	80
Renner ditch	Dry creek	June 1, 1874	6.42		2,531.84	81
Richardson ditch	Dry creek	June 15, 1874	2.70	....	2,538.26	82

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 5—Concluded.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
St. Vrain and Palmerton ditch, second enlargement	St. Vrain creek	June 30, 1874	84.26	164.31	2,540.96	83
Ullery ditch	Steele gulch	July 1, 1874	2.90		2,625.22	84
Bear & McCorey ditch, first enlargement	Dry creek	Jan. 1, 1875	.46	1.16	2,628.12	85
Altona ditch, first enlargement	Left Hand creek	April 15, 1875	8.66	10.67	2,628.58	86
Nelson ditch, third enlargement	Dry creek	May 1, 1875	.81	2.01	2,637.24	87
Denio & Taylor Extension ditch	St. Vrain creek	June 1, 1875	11.78		2,638.05	88
Davis & Downing ditch, fourth enlargement	St. Vrain creek	Oct. 1, 1876	1.44	16.24	2,649.83	89
James ditch, second enlargement	St. Vrain creek	April 1, 1877	12.55	27.11	2,651.27	90
Titus & Goyn ditch	Dry creek	April 1, 1878	6.42		2,663.82	91
Supply ditch	St. Vrain creek	May 31, 1878	92.20		2,670.24	92
Highland ditch, first enlargement	St. Vrain creek	June 1, 1878	23.57	229.03	2,762.44	93
Lake ditch, first enlargement	Left Hand creek	April 15, 1879	3.88	12.80	2,786.01	94
Toll Gate ditch, second enlargement	Left Hand creek	May 3, 1879	3.94	9.29	2,789.89	95
Taylor ditch No. 1	Dry creek	June 1, 1879	16.11		2,793.83	96
Taylor ditch No. 2	Second Dry creek	June 2, 1879	18.84		2,809.94	97
Lagerman Supply ditch	Spring gulch and Left Hand creek	Nov. 14, 1879	7.50		2,828.78	98
Dickens Private ditch No. 2	Booring Dry gulch	April 1, 1880	11.31		2,836.28	99

Coffin Meadow ditch	St. Vrain creek	May 1, 1880	4.83	----------	2,847.59	100
Lykins Gulch ditch	Lykins gulch	May 15, 1881	2.02	----------	2,852.42	101
Bacon (Northside) ditch	Big Hollow	May 20, 1881	1.75	----------	2,854.44	102
Bonus Lateral ditch	Dry creek	Mar. 1, 1870	1.95	----------	1,027.71	55 a
Rice ditch	Dry creek	Mar. 1, 1872	3.91	----------	2,127.32	66
Upper Baldwin ditch	Dry creek	April 1, 1872	9.11	----------	2,265.01	67 a
Lower Baldwin ditch	Dry creek	April 1, 1873	4.56	----------	2,341.77	73
John Rice ditch	Dry creek	April 1, 1884	7.81	----------	2,875.72	103
Rice ditch or Mill ditch, first enlargement	Dry creek	May 1, 1884	1.30	5.21	2,883.53	104

STATEMENT CONCERNING RESERVOIRS IN WATER DISTRICT NO. 5,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS OF WATER IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF RESERVOIR	Stream from Which Water Is Taken	Date of Appropriation	Order of priority in district
Pleasant Valley reservoir	St. Vrain creek	June 1, 1871	1
Highland Lake reservoir	St. Vrain creek	May 31, 1874	2
Left Hand reservoir	Left Hand creek	April 15, 1877	3
Lagerman reservoir	Left Hand creek, springs, gulches and sloughs	Sept. 3, 1878	4
Divide reservoir	St. Vrain creek	Mar. 1, 1879	5
Highland reservoir No. 1	St. Vrain creek	Nov. 15, 1879	6
Knoth reservoir	St. Vrain creek	April 25, 1880	7
Highland reservoir No. 2	St. Vrain creek	Nov. 15, 1881	8
Highland reservoir No. 3	St. Vrain creek	Nov. 15, 1881	......

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 6,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS OF WATER IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF DITCH, CANAL, OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
Lower Boulder ditch	Boulder creek	Oct. 1, 1859	25			1
Smith & Goss ditch	Boulder creek	Nov. 15, 1859	44.30		25	2
Howell ditch	Boulder creek	Dec. 1, 1859	47.55		69.30	3
Howard ditch	South Boulder creek	April 1, 1860	36		116.85	4
McGinn ditch	South Boulder creek	May 1, 1860	3.19		152.85	5
Jones & Donnelly ditch	South Boulder creek	May 1, 1860	14.36			
Autrey & Eggleston ditch	Coal creek	June 1, 1860	4.16		170.40	6
Schearer ditch	South Boulder creek	June 1, 1860	26.08			
Anderson ditch	Boulder creek	Oct. 1, 1860	25		200.64	7
Godding, Dailey & Plumb ditch	Boulder creek	Mar. 1, 1861	7.24		225.64	8
Houck No. 2 ditch	Boulder creek	April 1, 1861	7.16		232.88	9
Martha M. Mathews ditch	Boulder creek	June 1, 1861	4.60		240.04	10
N. K. Smith & Tyler ditch	Boulder creek	June 1, 1861	29.04			
Wm. C. Hake ditch	Coal creek	June 1, 1861	2.94			

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 6—Continued.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second and previously appropriated in district	Order of priority in district
East Boulder ditch	South Boulder creek	April 1, 1862	102.30	....	276.62	11
Plumb ditch	Boulder creek	April 1, 1862	5.10	....		
Eggleston ditch, No. 2	Coal creek	May 1, 1862	4.65	....	384.02	12
Rural ditch	Boulder creek	May 10, 1862	22.75	....	388.67	13
South Boulder and Bear Creek ditch	South Boulder creek	May 25, 1862	16.60	....	411.42	14
David H. Nichols ditch	Boulder creek	June 1, 1862	10	....	428.02	15
M. G. Smith ditch	Boulder creek	June 1, 1862	15	....		
G. Berkley ditch	Boulder creek	June 1, 1862	15	....		
Willman, Nichols & Hahn	Boulder creek	June 1, 1862	10.77	....		
Heirs of Elizabeth Harden and S. Wellman	Boulder creek	June 1, 1862	21	....		
Mary S. Stoddard, Robert Culver, heirs of Elizabeth Harden, George W. Rust and Perry White	Boulder creek	June 1, 1862	5	....		
William Breach	Boulder creek	June 1, 1862	2	....		
North Boulder Farmers' Ditch Co	Boulder creek	June 1, 1862	10.78	....		
Green ditch	Boulder creek	Sept. 15, 1862	34.58	....	517.57	16
Farmers' ditch	Boulder creek	Oct. 1, 1862	73.29	....	552.15	17
Rural ditch, first enlargement	Boulder creek	Mar. 10, 1863	198.29	....	625.44	18
Houck ditch, No. 1	Boulder creek	April 1, 1863	15.97	....	823.73	19

Cottonwood Ditch, No. 2	South Boulder creek	April 15, 1863	33.70	....	839.70	20
Dry Creek ditch (Davidson's)	South Boulder creek	May 1, 1863	29.95	....	873.40	21
Green ditch, first enlargement	Boulder creek	May 1, 1863	34.58	69.16		
Smith & Emmons ditch	Boulder creek	June 1, 1863	47.16	....	937.93	22
North Boulder Farmers' Ditch Co., first enlargement	Boulder creek	June 1, 1863	65	75.78		
Green ditch, second enlargement	Boulder creek	May 1, 1864	34.58	103.74	1,050.09	23
Dry Creek Ditch, No. 2	South Boulder creek	May 1, 1864	69	....		
McGinn ditch, first enlargement	South Boulder creek	May 1, 1864	....	3.19		
Andrews & Farwell ditch	South Boulder creek	June 1, 1864	1.35	....	1,153.67	24
North Boulder Farmers' Ditch Co., second enlargement	Boulder creek	June 1, 1864	115	190.78		
Carr & Tyler ditch	Boulder creek	June 1, 1864	33.73	....		
Enterprise ditch	South Boulder creek	Feb. 1, 1865	34.08	....	1,303.75	25
Butte Mill ditch	Boulder creek	Mar. 1, 1865	110.86	....	1,337.83	26
Howell & Beaseley ditch	Boulder creek	Mar. 1, 1865	28.80	....		
Lyner ditch	South Boulder creek	April 1, 1865	164	....	1,477.49	27
Godding, Dailey & Plumb ditch, first enlargement	Boulder creek	April 1, 1865	23.20	30.44		
Delehaut ditch	Boulder creek	May 1, 1865	37.12	....	1,664.69	28
Green ditch, third enlargement	Boulder creek	May 1, 1865	34.58	138.32		
South Boulder & Bear Creek ditch, first enlargement	South Boulder creek	May 9, 1865	26.41	43.01	1,736.39	29
Marshallville ditch	South Boulder creek	June 1, 1865	14.76	....	1,762.80	30
McGinn ditch, second enlargement	South Boulder creek	June 1, 1865	14.06	17.25		
Highland ditch, south side	Boulder creek	June 1, 1865	99.70	....		
Cottonwood ditch, No. 1	South Boulder creek	April 1, 1866	15.58	....	1,891.32	31
Enterprise ditch, first enlargement	South Boulder creek	May 1, 1866	40.76	74.84	1,906.90	32
Central ditch	South Boulder creek	May 15, 1866	14.36	....	1,947.66	33

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 6—Continued.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
South ditch	South Boulder Creek	June 1, 1866	9.16		1,962.02	34
McKenzie ditch	Coal creek	June 1, 1866	18.00			
Leggett ditch	Boulder creek	May 1, 1868	31.35		1,989.18	35
South Boulder and Bear Creek ditch, second enlargement	South Boulder creek	May 15, 1868	54.69	97.70	2,020.53	36
Highland ditch (south side), first enlargement	Boulder creek	June 1, 1868	152.20	251.90	2,075.22	37
Eggleston Ditch, No. 1	Coal creek	Oct. 1, 1869	6.58		2,227.42	38
Taylor ditch	Boulder creek	April 1, 1870	10.71		2,234.00	39
Last Chance ditch	Coal creek	May 1, 1870	10.78		2,214.71	40
South Boulder Canon ditch	South Boulder creek	May 15, 1870	26.37		2,255.49	41
Lower Boulder ditch, first enlargement	Boulder creek	June 1, 1870	97.00	122.00	2,281.86	42
Church ditch	Coal creek	Sept. 20, 1870	18.11		2,378.86	43
Cottonwood Ditch, No. 1, first enlargement	South Boulder creek	Oct. 1, 1870	36.72	52.30	2,396.97	44
Andrews & Farwell ditch, first enlargement	South Boulder creek	April 1, 1871	7.61	8.96	2,433.69	45
Boulder and Weld County ditch	Boulder creek	May 1, 1871	59.40		2,441.30	46
South Boulder and Bear Creek ditch, third enlargement	South Boulder creek	May 15, 1871	129.10	226.80	2,500.70	47
South Boulder Canon ditch	South Boulder creek	May 15, 1871	192.00			
Davidson ditch	South Boulder creek	April 15, 1872	116.30		2,821.80	48
Kinnear ditch and reservoir	Coal creek	May 20, 1872	26.48		2,938.10	49

East Boulder ditch, first enlargement	South Boulder creek	June 1, 1872	127.20	229.50	2,964.58	50
South Boulder and Coal Creek ditch	South Boulder creek	June 1, 1872	53.55	....		
Goodhue ditch and reservoir	South Boulder creek	June 1, 1873	30.31	....	3,145.33	51
South Boulder and Rock Creek ditch	South Boulder creek	June 1, 1873	65.93	....		
Boulder and White Rock ditch	Boulder creek	Nov 1, 1873	747.28	....	3,241.57	52
Boulder and Left Hand Ditch Co	Boulder creek	Dec. 1, 1873	82.80	....	3,988.85	53
Four-Mile Canon ditch	Four-Mile Canon creek	April 1, 1875	76.56	....	4,071.65	54
Six-Mile Bottom ditch	Jains gulch	April 1, 1875	48.80	....		
North Branch of Six-Mile Bottom ditch	Jains gulch	April 1, 1875	48.80	....		
Davidson ditch, first enlargement	South Boulder creek	May 10, 1875	105.05	221.35	4,245.81	55
Town of Boulder ditch	Boulder creek	June 17, 1875	6.19	....	4,350.86	56
Boulder and Left Hand Ditch Co., first enlargement	Boulder creek	April 1, 1876	163.80	246.60	4,357.05	57
Forbes ditch	Four-Mile Canon creek	April 1, 1878	60.66	....	4,520.85	58
Wellman ditch	Boulder creek	May 1, 1878	12.74	....	4,581.51	59
Leyner ditch, first enlargement	South Boulder creek	June 30, 1878	31.92	195.92	4,594.25	60
Mathews ditch	Boulder creek	Feb. 13, 1879	60.60	....	4,626.17	61
Enterprise ditch, second enlargement	South Boulder creek	June 1, 1881	54.25	129.09	4,686.77	62
Revolution ditch	Boulder creek	Dec. 7, 1881	99.97	....	4,741.02	63
Kerr ditch, No. 1	Coal creek	April 15, 1861	7.68	....	210.01	9 a
Kerr ditch, No. 2	Coal creek	April 15, 1868	3.24	....	1,996.86	34 a
Willis ditch	Coal creek	May 5, 1870	9	....	2,266.41	40 a
Maffet ditch	Coal creek	Feb. 4, 1889	3	....	4,860.91	64

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 6—Concluded.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
Marshall ditch, No. 1	Spring brook	May 8, 1893	.78			1
Marshall ditch, No. 2	Spring brook	May 8, 1893	1.50		2.28	2
Rea ditches, Nos. 1 and 2	Gregory Canon creek	Mar. 1, 1884	1.12			1

STATEMENT CONCERNING RESERVOIRS IN WATER DISTRICT NO. 6,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS OF WATER IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Amount of water appropriated	Order of priority in district
Eggleston reservoir No. 5	Coal creek	June 1, 1874	1,015,860	2
Eggleston reservoir No. 4	Coal creek	Oct. 1, 1879	8,000,000	3
Marshall reservoir No. 1	Spring Brook through Marshall ditch No. 2	May 8, 1893	191,600	1

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 7,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS OF WATER IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
Wadsworth ditch	Clear creek	Feb. 25, 1860	3.31	----------	----------	1
Lees & Baugh ditch	Clear creek	May 15, 1860	5	----------	3.31	2
South Side ditch	Clear creek	May 16, 1860	2	----------	8.31	3
Brown's Island ditch	Clear creek	May 19, 1860	.90	----------	10.31	4
Ouelette ditch	Clear creek	May 31, 1860	15	----------	11.21	5
Wannemaker ditch	Clear creek	June 1, 1860	8	----------	26.21	6
Sherrick ditch	Clear creek	June 14, 1860	1.12	----------	34.21	7
Lee's Island ditch	Clear creek	June 30, 1860	.50	----------	35.33	8
Golden Canal Company's ditch	Clear creek	July 1, 1860	39.80	----------	35.83	9
Manhart ditch	Ralston creek	Aug. 31, 1860	.80	----------	75.63	10
Swadley & Logan ditch	Ralston creek	April 10, 1861	5.50	----------	76.43	11
Cort, Graves & Hughes ditch	Clear creek	April 30, 1861	7	----------	81.93	12
Kershaw ditch	Clear creek	May 2, 1861	16	----------	88.93	13
Claus & Couch ditch	Clear creek	May 13, 1861	9.90	----------	104.93	14
Swadley ditch	Clear creek	May 14, 1861	6	----------	114.83	15

Haines ditch	Ralston creek	May 30, 1861	1.31		120.83	16
Lee ditch	Clear creek	June 2, 1861	1.12		122.14	17
Piquette ditch	Ralston creek	June 6, 1861	2.03		123.26	18
Miles & Eskins ditch	Clear creek	June 11, 1861	4		125.29	19
Fisher ditch	Clear creek	June 29, 1861	35		129.29	20
Graves North ditch	Clear creek	June 30, 1861	1.75		164.29	21
Clear Creek and Platte River ditch	Clear creek	Nov. 1, 1861	49.50		166.04	22
Rocky Mountain ditch	Clear creek	May 1, 1862	9.21		215.09	23
Brainard Tucker ditch	Ralston creek	May 1. 1862	2.93			
Slater ditch	Clear creek	May 16, 1862	1.80		227.23	24
Swadley ditch, first enlargement	Clear creek	June 1, 1862	9	15	229.03	25
Bunny & Ballinger ditch	Ralston creek	June 6, 1862	2.70		238.03	26
Sayer & Lees ditch	Clear creek	June 14, 1862	7		240.73	27
Manhart ditch, first enlargement	Ralston creek	June 20, 1862	.20	1	247.73	28
Sanderson & Slater ditch	Clear creek	July 1. 1862	.90		247.93	29
Wolff ditch	Clear creek	July 5, 1862	3.06		248.83	30
Wolff North ditch	Clear creek	July 5, 1862	2			
Wadsworth & Graves ditch	Clear creek	July 10, 1862	1.35		253.89	31
Lee, Stewart & Eskins ditch	Clear creek	April 17, 1863	2.18		255.24	32
Graves South ditch	Clear creek	May 21, 1863	3		257.42	33
Bluff ditch	Clear creek	May 26, 1863	2.60		260.42	34
Juchens & Ouelette ditch	Clear creek	May 28, 1863	3.22		263.02	35
Sanderson ditch	Clear creek	May 31, 1863	1		266.24	36
Slater & Moody ditch	Clear creek	June 20, 1863	4		267.24	37
McQuiston ditch	Ralston creek	June 25, 1863	1.30		271.24	38

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 7—Continued.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
Rhodes Middle ditch	Clear creek	Aug. 1, 1863	3		272.54	39
Clear Creek and Platte River ditch, first enlargement	Clear creek	Nov. 5, 1863	20.56	70.06	275.54	40
Cort & Graves ditch	Clear creek	May 1, 1864	11		296.10	41
Bluff ditch, first enlargement	Clear creek	May 27, 1864	2.40	5	307.10	42
Rocky Mountain ditch, first enlargement	Clear creek	May 31, 1864	7.30	16.51	309.50	43
Bunny & Ballinger ditch, first enlargement	Ralston creek	June 5, 1864	1.78	4.48	316.80	44
Piquette ditch, first enlargement	Ralston creek	June 6, 1864	1.88	3.91	318.58	45
Wolff ditch, first enlargement	Clear creek	June 14, 1864	3.78	6.84	320.46	46
Lane ditch	Clear creek	June 20, 1864	11		324.24	47
Manhart ditch, second enlargement	Ralston creek	June 30, 1864	11.80	12.80	335.24	48
Golden City and Ralston Creek ditch	Clear creek	Feb. 28, 1865	41.43		347.04	49
Rocky Mountain ditch, second enlargement	Clear creek	Mar. 31, 1865	47.13	63.64	388.47	50
Juchens & Ouelette ditch. first enlargement	Clear creek	April 23, 1865	5.78	9	435.60	51
Wolff ditch, second enlargement	Clear creek	May 6, 1865	2.06	8.90	441.38	52
Swadley ditch, second enlargement	Clear creek	May 16, 1865	10	25	443.44	53
Davis & Rand ditch	Ralston creek	May 26, 1865	5		453.44	54
Brown & Baugh ditch	Clear creek	May 26, 1865	10			

Clark & Brown ditch	Ralston creek	May 31, 1865	3.70		468.44	55
Graves North ditch, first enlargement	Clear creek	June 13, 1865	1.86	3.61	472.14	56
Rhodes South ditch	Clear creek	July 5, 1865	3.16		474	57
Reed ditch	Ralston creek	Aug. 31, 1865	2.70		477.16	58
Wadsworth ditch, first enlargement	Clear creek	Nov. 2, 1865	9.69	13	479.86	59
Hains & Ballinger ditch	Ralston creek	May 14, 1866	2.80		489.55	60
Colorado Agricultural ditch	Clear creek	Mar. 5, 1867	30.20		492.35	61
Rand ditch	Lyden creek	April 27, 1867	4		522.55	62
North Side ditch	Clear creek	April 30, 1867	2		526.55	63
Lee, Stewart & Eskins ditch, first enlargement	Clear creek	Feb. 23, 1868	4.30	6.48	528.55	64
Churches ditch	Ralston creek	May 31, 1868	5.84		532.85	65
Wannemaker ditch, first enlargement	Clear creek	Nov. 5, 1868	13	21	538.69	66
Lee, Stewart & Eskins ditch, second enlargement	Clear creek	Mar. 31, 1869	19.77	26.25	551.69	67
Hains & Piquette ditch	Ralston creek	May 10, 1869	5		571.46	68
Reno & Juchens ditch	Clear creek	May 24, 1869	6.31		576.46	69
Golden ditch	Clear creek	Feb. 11, 1871	26		582.77	70
Lee, Stewart & Eskins ditch, third enlargement	Clear creek	April 13, 1871	6.94	33.19	608.77	71
Homestead ditch	Ralston creek	May 6, 1871	2		615.71	72
Golden Canal Co.'s ditch, first enlargement	Clear creek	April 1, 1872	154	193.80	617.71	73
Rocky Mountain ditch, third enlargement	Clear creek	Mar. 15, 1873	113.66	177.30	771.71	74
Churches ditch, first enlargement	Ralston creek	May 20, 1873	2.89	8.93	885.37	75
Ballinger ditch	Ralston creek	May 31, 1873	1.68		888.26	76
Colorado Agricultural ditch, first enlargement	Clear creek	April 5, 1874	31.80	62	889.94	77
Wadsworth & Graves ditch, first enlargement	Clear creek	May 5, 1874	4.92	6.27	921.74	78
Agricultural ditch	Clear creek	Dec. 21, 1874	101.54		926.96	79

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 7—Concluded.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
Golden City and Ralston Creek ditch, first enlargement	Clear creek	Nov. 18, 1877	18.26	59.69	1,028.20	80
Reno & Juchens ditch, first enlargement	Clear creek	Mar. 2, 1878	18.19	24.50	1,046.46	81
Rocky Mountain ditch, fourth enlargement	Clear creek	Mar. 16, 1878	12.70	190	1.064.65	82
Davis & Brown ditch	Leyden creek	May 11, 1878	3		1,077.35	83
Golden City and Ralston Creek ditch, second enlargement	Clear creek	Nov. 15, 1878	18.85	78.54	1.080.35	84
Golden City and Ralston Creek ditch, third enlargement	Clear creek	Nov. 20, 1881	32.34	110.88	1,099.20	85
Agricultural ditch, first enlargement	Clear creek	Mar. 24, 1883	48.46	150	1,131.54	86
				Total	1.181.54	

STATEMENT

GIVING DITCH DECREES IN WATER DISTRICT NO. 7, AS THEY HAVE BEEN ORDERED SINCE THE STATEMENT PUBLISHED IN THE "FIFTH BIENNIAL REPORT," PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF DIVISION NO. 1, FROM CERTFIED COPIES OF DECREES FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.

NAME OF DITCH OR CANAL	Source of Supply	Date of appropriation	Amount of appropriation in cubic feet
Farmers' High Line Canal and Reservoir Co. ditch	Clear creek	July 1, 1880	335.86
Big Dry Creek ditch	Big Dry creek	Dec. 15, 1889	33.60
Bowles ditch	Dry creek	April, 1873	5
Westminster Waste Water ditch	Dry creek	July 15, 1893	5
Colfax Waste Water ditch	Dry creek	July 19, 1893	5
Slough Drainage ditch	Slough	Aug. 11, 1893	5
		Total	389.46

STATEMENT CONCERNING RESERVOIRS IN WATER DISTRICT NO. 7,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS OF WATER IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Capacity of reservoir in cubic feet	Cubic feet of water per second appropriated to each priority	Summation of appropriations to each reservoir	Cubic feet of water previously appropriated	Order of priority in district
Churches reservoir	Ralston creek	May 31, 1868	----------	5.84	----------	----------	1
Tucker reservoir	Ralston creek	June 1, 1869	----------	5	----------	5.84	2
Churches reservoir, first enlargement	Ralston creek	Mar. 20, 1873	----------	2.89	8.73	10.84	3
Sloan Lake and Cooper Lake reservoirs	Clear creek	May 1, 1873	----------	37	----------	13.73	4
Long Lake reservoir	Ralston creek	May 29, 1873	----------	7.54	----------	50.73	5

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO 8,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second priviously appropriated in district	Order of priority in district
Platte Water Co.'s ditch	South Platte	Nov. 28, 1860	30	----------	----------	1
Rough and Ready ditch and mill race	South Platte	Dec. 31, 1860	37	----------	30	2
Garber Creek ditch No. 1	Garber creek	June 30, 1861	2.79	----------	67	3
Platte Canon ditch	South Platte	July 30, 1861	4 70	----------	69.79	4
Nevada Ditch Co.'s ditch	South Platte	Aug. 30, 1861	28	----------	74.49	5
Petersburg Co.'s ditch	South Platte	Nov. 30, 1861	21.60	----------	102.49	6
Fifty-nine No. 1 ditch	Cherry creek	May 1, 1862	7.28	----------	124.09	7
Spring Creek ditch	Spring creek	June 1. 1862	1.83	----------	131.37	8
Brown ditch	South Platte	Nov. 30, 1862	16.50	----------	133.20	9
Hayland ditch	Deer creek	Dec. 1, 1862	2.52	----------	149.70	10
Smith-Canal or Ditch Co.'s ditch	South Platte	Dec. 1, 1863	----------	----------	----------	11
Platte Canon ditch, first enlargement	South Platte	Dec. 30, 1863	34	38.70	152.22	12
Fifty-nine ditch No. 2	Plum creek	Dec. 31, 1863	9	----------	186.22	13
Platte and Denver Ditch Co.'s ditch	South Platte	Oct. 7, 1864	61.71	----------	195.22	14
Chatham ditch	Garber creek	Dec. 30, 1864	5	----------	256.93	15
Platte Canon ditch, second enlargement	South Platte	Dec. 30, 1864	17.30	56	261.93	

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 8—Continued.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
Nevada Ditch Co.'s ditch, first enlargement	South Platte	Dec. 30, 1865	34.30	62.30	279.23	16
Meadow ditch	Indian creek	May 31, 1866	5		313.53	17
Ditch of John Jones	Cherry creek	May 31, 1866	2.61		318.53	
Sunny Bank ditch	Garber creek	June 1, 1866	1.83		321.14	18
Lemen ditch	Cherry creek	June 1, 1866	12.72		322.97	
Benjamin Quick ditch	West Plum creek	June 15, 1866	3.80		335.69	19
Craig ditch	West Plum creek	Aug. 30, 1866	2.92		339.49	20
Smith Canal or Ditch Co.'s ditch, first enlargement	South Platte	Dec. 30, 1866				21
Kelly ditch	Plum creek	Mar. 30, 1867	2.52		342.41	22
Sixty-seven ditch	West Cherry creek	June 15, 1867	6.82		344.93	23
Pleasant Park ditch	Bear creek	Aug. 30, 1867	7.56		351.75	24
Bear Creek ditch	Bear creek	June 30, 1867	4.39		359.31	25
Ditch of Willis Bryant	Plum creek	June 30, 1867	5		363.70	
Kountze ditch	West fork of West Plum creek	June 30, 1867	2.52		368.10	
Grant ditch	West fork of West Plum creek	June 30, 1867	2.52		371.32	
Fifty-nine ditch No. 2, first enlargement	Plum creek	July 30, 1867	4.50	13.50	373.84	26
Glen Plynn ditch No. 1	Deer creek	Dec. 1, 1867	1.95		378.34	27
Rough and Ready ditch and mill-race, first enlargement	South Platte	Dec. 31, 1867	31.27	68.27	380.29	28

Selzell ditch	Deer creek	Jan. 1, 1868	2.18	....	411.56	29
Ditch of John Kinner	West Plum creek	Mar. 1, 1868	3.52	....	413.74	30
Last Chance ditch	South Platte	Mar. 3, 1868	32	....	417.26	31
First Attempt ditch	Cherry creek	Mar. 30, 1868	32	....	449.26	32
Flinton & Carey ditch	Garber creek	July 30, 1868	2.17	....	481.26	33
Ditch of Ahimaaz Gove	West Plum creek	June 1, 1869	2.52	....	483.43	34
Hawkey, Daue & Gird ditch	Cherry creek	July 30, 1869	2.50	....	485.95	35
Boss ditch	Cherry creek	July 30, 1869	4.72	....	488.45	
East Plum Creek ditch	East Plum creek	July 30, 1869	.55	....	493.17	
Red Rock and Spring Creek ditch (upper branch)	Spring creek	May 30, 1870	3	....	493.72	36
Red Rock and Spring Creek ditch (lower branch)	Spring creek	June 1, 1870	3	....	496.72	37
Cook Creek ditch	Cook creek	June 30, 1870	3 80	....	499.72	38
Lower Plum Creek ditch	Plum creek	Dec. 30, 1870	11	....	503.52	39
Arnold ditch	Carpenter creek	Dec. 31, 1870	1	....	514.52	40
Fairview ditch and reservoir	Deer creek	April 30, 1871	14	....	515.52	41
Ratcliff Spring Creek ditch	Spring creek	June 1, 1871	5 41	....	531.52	42
Plum Creek ditch	Plum creek	June 1, 1871	3	....	536.93	
Flinton & Carey ditch, first enlargement	Garber creek	June 30, 1871	2.17	4.34	539.93	43
Ditch of C. Alphonse Jarre	Jarre creek	July 1, 1871	1.50	....	542.10	44
High Line ditch	Plum creek	Sept. 1, 1871	3.52	....	543.60	45
Snell ditch	Cherry creek	Sept. 30, 1871	16	....	547.10	46
Garber Creek ditch No. 1	Garber creek	Dec. 1, 1871	1.40	4.19	563.10	47
Houston ditch	Jackson creek	Dec. 30, 1871	2.67	....	564 50	48
Ball ditch	West Plum creek	April 19, 1872	3	....	567 17	49
Success ditch	Cherry creek	April 30, 1872	24	....	570.17	50

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 8—Continued.

NAME OF DITCH, CANAL, OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
Ratcliff Plum Creek ditch	West Plum creek	May 30, 1872	7.50	....	594.17	51
McLeod ditch	Deer creek	June 1, 1872	3.90	....	601.67	52
Indian Creek ditch	Indian creek	July 3, 1872	4	....	605.57	53
Birmingham ditch	Cherry creek	Dec. 30, 1872	5	....	609.57	54
Happy Canon Reservoir ditch and reservoirs	Happy Canon creek	April 1, 1873	3	....	614.57	55
Ditch of Charles Newmarch	Plum creek	April 30, 1873	3	....	617.57	56
Cann ditch No. 1	Rainbow creek	April 30, 1873	2	....		
Purdy ditch	Garber creek	May 30, 1873	2	....	620.57	57
Dakan ditch	Dry creek	June 1, 1873	1.95	....	622.57	58
West ditch	Carpenter creek	June 30, 1873	2	....	624.52	59
French ditch	Indian creek	June 30, 1873	3	....	626.52	60
Indian Creek ditch	Indian creek	June 30, 1873	8	....		
High Line ditch, first enlargement	Plum creek	June 30, 1873	1.40	4.92		
Houston ditch, first enlargement	Jackson creek	June 30, 1873	4	6.67		
Haley ditch	Cherry creek	July 1, 1873	4	....	638.92	61
Garber Creek, No. 2	Garber creek	Aug. 30, 1873	1.06	....	642.92	62
Kountze ditch	East Plum creek	Sept. 1, 1873	.75	....	643.98	63
Platte Water Company's ditch, first enlargement	South Platte	Nov. 1, 1873	13	43	644.73	64

Petersburg Water Co.'s ditch, second enlargement	South Platte	Dec. 30, 1873	27	54	657.73	65
Hawkey, Dane & Gird ditch, first enlargement	Cherry Creek	Dec. 30, 1873	2	4.50		
Stewart ditch	West Plum creek	April 1, 1874	5		686.73	66
Woodhouse ditch	Indian creek	April 1, 1874	2.30			
Sobey ditch	Indian creek	April 30, 1874	1.48		694.03	67
Harrison ditch	Cherry creek	May 30, 1874	4.36		696.51	68
Barrows ditch	Indian creek	June 30, 1874	2.48		700.87	69
Ditch of George Dane	Cherry creek	June 30, 1874	1.80			
Fifty-nine ditch No. 1, first enlargement	Cherry creek	Dec. 30, 1874		7.28	705.15	70
Smith Canal or Ditch Co.'s ditch, second enlargement	South Platte	Dec. 30, 1874		55		
Goodrich ditch	Cherry creek	Dec. 30, 1874	5			
West Cherry Creek ditch	Cherry creek	Feb. 28, 1875	6.87		710.15	71
Murmur ditch	Cherry creek	Mar. 30, 1875	3.25		717.02	72
Perry ditch	Plum creek	June 30, 1875	1.47		720.27	73
Cleona ditch	Cherry creek	June 30, 1875	2			
Crawford ditch	Cherry creek	June 30, 1875	5			
Cann ditch No. 2	Indian creek	Oct. 30, 1875	1.83		728.74	74
Pioneer ditch	Cherry creek	Mar. 9, 1876	5.83		730.57	75
Smith ditch	East Cherry creek	Mar. 10, 1876	4.52		736.30	76
John B. Hixon's ditch	Cherry creek	Spring, 1876				77
McCracken ditch	East Cherry creek	June 30, 1877	3		740.82	78
Upton T. Smith's ditch	Spring creek	June 30, 1877	1			
Deer Creek Canon ditch and Mann reservoir	Deer creek	Dec. 8, 1877	3.33		744.82	79
Ditch of J. F. Gardner	Cherry creek	Dec. 18, 1877	5.92		748.15	80
Monroe ditch	Cherry creek	May 30, 1878	3.25		754.07	81

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 8—Concluded.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
High Line ditch, second enlargement	Plum creek	June 30, 1878	15.08	20	757.32	82
Thirty-three (33) ditch	Plum creek	June 30, 1878	3.44			
Smith Canal or Ditch Co.'s ditch, third enlargement	South Platte	July 30, 1878	7.57	57.57	775.84	83
Montgomery ditch	Cherry creek	Sept. 1, 1878	3.50		783.41	84
Denver City Irrigation and Water Co.'s canal, reservoir and water works	South Platte	Sept. 10, 1878	278.26		786.91	85
Cleona ditch, first enlargement	Cherry creek	Oct. 30, 1878	1.50	3.50	1,065.17	86
Murmur ditch, first enlargement	Cherry creek	Dec. 30, 1878	1.75	5	1,068.67	87
✓ Northern Colorado Irrigation Co.'s ditch	South Platte	Jan. 18, 1879	1,184		1,073.67	88
Happy Canon reservoir, ditch and reservoirs, first enlargement	Happy Canon creek	Mar. 10, 1879	.80		2,257.67	89
Pioneer ditch, first enlargement	Cherry creek	June 30, 1879	1.17	7	2,258.47	90
Shore ditch	Cherry creek	June 30, 1879	5			
East Side ditch	Carpenter creek	Aug. 30, 1879	2		2 264.64	91
Ditch of George Dane, first enlargement	Cherry creek	Oct. 30, 1879	.49	2.29	2,266.64	92
Snyder ditch	West Fork of Plum creek	Nov. 1, 1879	3		2,267.13	93
Hawkey, Dane & Gird ditch, second enlargement	Cherry creek	Dec. 30, 1879	15.15	19.65	2,270.13	94
Stevens ditch	Plum creek	Dec. 30, 1879	7.56			
Gillman ditch	Cherry creek	Feb. 28, 1880	9.90		2,292.84	95
Huntsville ditch	West Plum creek	Mar. 1, 1880	9.12		2,302.74	96

Reservoir ditch	East Plum creek	Mar. 3, 1880	8.24		2,311.86	97
Castle Rock ditch and reservoir	Plum creek	April 1, 1880	2		2,320.10	98
Enterprise ditch No. 1	Plum creek	April 15, 1880	10.12		2 322.10	99
Little Daisy ditch	Garber creek	May 10, 1880	.99		2,332.22	100
Monroe ditch, first enlargement	Cherry creek	May 30, 1880	1.25	4.50	2,323.21	101
Enterprise ditch No. 2	Cherry creek	May 14, 1881	4 50		2,324.46	102
Excelsior ditch	Cherry creek	May 25, 1881	4.50		2,328.96	103
Purdy ditch, first enlargement	Garber creek	May 30, 1881	2	4	2,333.46	104
Glen Plynn ditch No. 2	Deer creek	May 30, 1881	12			
Hillside ditch	Cook creek	July 1, 1881	3.65		2,347.46	105
Phelan ditch	East Plum creek	Aug. 1. 1881	2.73		2,351.11	106
Ditch of J. Byron Tucker	Cherry creek	Nov. 1, 1881	4.36		2,353.84	107
Alderman ditch	East Cherry creek	Nov. 1, 1881	5			
Hill ditch	Garber creek	Jan. 1. 1882	2		2,363.22	108
Lake Gulch ditch	Lake Gulch	Feb. 28, 1882	2		2,365.22	109
Platte Water Company's ditch, second enlargement	South Platte	Mar. 7, 1882	42.95	85.95	2,367.22	110
Antelope ditch	Antelope creek	Mar. 31, 1882	3.85		2 410.17	111
Spring Creek ditch, first enlargement	Spring creek	May 15, 1882	2.59	4.42	2,414.02	112
Necessity ditch	West Cherry creek	June 26, 1882	6.67		2,416.61	113
*Petersburg Company's ditch, first enlargement	South Platte	Dec. 30, 1883	5.40	27	2,423.28	114

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*It is thought that the first enlargement of the Petersburg Company's ditch should have been dated December 30, 1873, and that the date of December 30, 1883, is a clerical error in the certified copy of decree. The order of priority in this table corresponds to the dates of appropriations. The record of the quantities of water appropriated previous to the allotments to the several priorities will vary somewhat according to the interpretations given the decree, and is only approximately correct.

STATEMENT CONCERNING DITCHES IN WATER DISTRICT NO. 9,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
McBroom ditch	Bear creek	Nov, 1, 1859	11.58			1
Simonton ditch	Bear creek	Dec. 25, 1860	35.76		11.58	2
Hodgson ditch	Bear creek	June 1, 1861	8.25		47.34	3
Warrior ditch	Bear creek	Dec. 1, 1861	12.33		55.59	4
Pioneer Union ditch	Bear creek	Dec. 10, 1861	12.41		67.92	5
Olson & Bell ditch	Bear creek	Mar. 15, 1862	6.30		80.33	6
Hindry ditch	Bear creek	April 15, 1862	9.15		86.63	7
Warrior ditch	Turkey creek	April 16, 1862	2.86		95.78	8
Hodgson ditch, first enlargement	Bear creek	May 31, 1862	2.07	10.32	98.64	9
Lawn ditch	Bear creek	June 10, 1862	1.47		100.71	10
Pioneer Union ditch	Bear creek	Sept. 1, 1862	18.13	30.54	102.18	11
Spickerman ditch	Turkey creek	Nov. 1, 1862	10.61		120.31	12
Lewis & Strouse ditch	Bear creek	Mar. 1, 1863	30.86		130.92	13
Warrior ditch	Bear creek	Oct. 31, 1864	25.47		161.78	14
Pioneer Union ditch, first enlargement	Bear creek	Mar. 15, 1865	25.13	45.67	187.25	15

Warrior ditch	Bear creek	April 1, 1865	11.49		212.38	16
Strouse ditch	Bear creek	May 1, 1865	4.80		223.87	17
Spickerman Lower ditch	Turkey creek	June 1, 1865	9.32		228.67	18
Robert Lewis ditch	Bear creek	Oct. 1, 1865	17		237.99	19
Hindry ditch, first enlargement	Bear creek	Dec. 31, 1867	8.94	18.09	254.99	20
Arnett ditch	Turkey creek	April 15, 1868	10.75		263.93	21
Spickerman Middle ditch	Turkey creek	June 1, 1868	6.46		274.68	22
Arnett ditch	Bear creek	Mar. 16, 1869	7.94	18.69	281.14	23
Churn ditch	Bear creek	April 15, 1870	1.49		289.08	24
Arnett ditch, first enlargement	Bear creek	May 1, 1871	25.54	44.23	290.57	25
Fischer ditch	Bear creek	Sept. 16, 1871	2.88		316.11	26
Bergen ditch	Turkey creek	May 1, 1874	12		318.99	27
Independent High Line ditch	Turkey creek	Sept. 6, 1878	26.68		330.99	28
Independent High Line ditch, first enlargement	Turkey creek	Sept. 25, 1881	4.01	30.69	357.67	29
Arnett ditch, second enlargement	Bear creek	Mar. 1, 1882	12.87	56.10	361.68	30
Ward ditch	Bear creek	Dec. 6, 1882	63		374.55	31

STATEMENT CONCERNING RESERVOIRS IN WATER DISTRICT NO. 9,

PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREE GOVERNING APPROPRIATIONS OF WATER IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Cubic feet per second previously appropriated in district	Order of priority in district
Harriman reservoir	One-fifth Turkey creek Four-fifths Bear creek	May 1, 1873	18.09	----------	----------	1
Bergen reservoirs, first enlargement	Turkey creek	May 1, 1874	12	----------	18.09	2
Harriman reservoir	One-fifth Turkey creek Four-fifths Bear creek	April 1, 1875	37.58	55.67	30.09	3
Bowles reservoirs	Bear creek	May 10, 1876	11.06	----------	67.67	4
Deane reservoir	Turkey creek	Sept. 6, 1878	26.68	----------	78.73	5
Bowles reservoirs, first enlargement	Bear creek	May 15, 1880	15.75	26.81	105.41	6
Johnston reservoir	Bear creek	May 15, 1880	26.81	----------	121.16	7
Deane reservoir, first enlargement	Turkey creek	Sept. 25, 1881	4.01	30.69	147.97	8
Ward & Kendrick reservoirs	Bear creek	Dec. 6, 1882	63	----------	151.98	9

STATEMENT CONCERNING DITCHES

IN WATER DISTRICT NO. 23 (SOUTH PARK), GIVING THE DATE AND ORDER OF PRIORITY, AND AMOUNT OF EACH APPROPRIATION, TOGETHER WITH THE TOTAL AMOUNT OF EACH PRECEDING APPROPRIATION OF DITCHES AND CANALS IN SAID DISTRICT, AS THEY HAVE BEEN ESTABLISHED BY THE DECREE OF COURT OF THE FOURTH JUDICIAL DISTRICT. FROM THE CERTIFIED COPY OF THE DECREE, AS FURNISHED BY THE CLERK OF THE COURT.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Actual maximum capacity, as determined by actual gagings	Cubic feet per second previously appropriated in district	Order of priority in district
Beery ditch	Four-Mile creek	June 15, 1861	39.49				1
Trout Creek ditch	Trout creek	July 1, 1862	Entire flow			39.49	2
Borden ditch	Tarryall creek, through Mill ditch	May 1, 1866	10	10		39.49	3
Crosier ditch	House creek	May 1, 1866	Entire flow			49.49	4
Mill ditch	Tarryall creek	Aug. 1, 1866	43.46			49.49	5
Guiraud ditch	Middle Fork of South Platte	July 1, 1867	48.97		7.65	92.95	6
Canon ditch	Middle Fork of South Platte	July 15, 1867	57.59		15	141.92	7
Small ditch	Midlde Fork of South Platte	May 1, 1868	1.32			190.51	8
Four-Mile ditch	Four-Mile creek	June 1, 1868	15	15		200.83	9
Prince ditch	Middle Fork of South Platte	Aug. 1, 1868	10	10	O. K.	215.83	10
Wilkin ditch	Tarryall creek	May 15, 1871	10			225.83	11
Ratcliff ditch No. 1	Ratcliff's gulch	May 1, 1872	.60			235.83	12
Hopson ditch	Unnamed creek	May 15, 1872	5.40	5.40		236.43	13
Rock Creek ditch	Rock creek	June 15, 1872	2.70	2.70		241.83	14
Stevens ditch No. 1	Little Trout creek	July 1, 1872	2			244.53	15

STATEMENT CONCERNING DITCHES—Continued.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Actual maximum capacity, as determined by actual gagings	Cubic feet per second previously appropriated in district	Order of priority in district
Stevens ditch No. 2	Little Trout creek	Sept. 1, 1872	2			246.53	16
Ratcliff ditch No. 2	Rock creek	May 20, 1873	4.21			248.53	17
Miller & Chapman ditch	Middle Fork of South Platte	May 23, 1873	10	10		252.74	18
Sigafus ditch	Middle Fork of South Platte	May 25, 1873	25	25	17.14	262.74	19
Haver ditch No. 1	Sonth Fork of South Platte	June 25, 1873	24.32			287.74	20
Anderson ditch No. 3	Middle Fork of South Platte	July 1, 1873	13.40			312.06	21
Allen & Milligan ditch	Four-Mile creek	August, 1873	15			325.46	22
Chapelle ditch	South Fork of South Platte	Sept. 1, 1873	6		O. K.	340.46	23
Kester Sweet ditch	South Fork of South Platte	June 1, 1874	25.39		O. K.	346.46	24
Daniel Fyffe ditch	Four-Mile creek	June 1, 1874	6			371.85	25
Stevens ditch No. 3	Little Trout creek	June 1, 1874	2			377.85	26
Rock Creek ditch, first enlargement	Rock Creek	June 1, 1874	2.30	5		379.85	27
Reinhardt ditch No. 1	Four-Mile creek	June 1, 1874	36			382.15	28
Brownlow & Stephens ditch	Four-Mile creek	June 10, 1874	21.44			418.15	29
Pruden ditch	Pruden creek	June 15, 1874	13.50			439.59	30
Troppe ditch	Tarryall creek	July 1, 1874	1.05			453.09	31
Stevens ditch No. 4	Little Trout creek	July 1, 1874	2			454.14	32
Burns & Sessions ditch	Jefferson creek	Oct. 1, 1874	27			456.14	33

Randall & Nicholas ditch	Michigan creek	Oct. 14, 1874	48			483.14	34
Borden ditch No. 2	Tarryall creek	Nov. 1, 1874	9.46			531.14	35
Mary G. Borden ditch	Tarryall creek	Nov., 1874	6			540.60	36
Demick ditch	Michigan creek	April 12, 1875	14	14		546.60	37
Fehringer ditch No. 1	Middle Fork of South Platte	April 20, 1875	17.90			560.60	38
Crozier & Hauxhurst ditch	Jefferson creek	April 25, 1875	21.24			578.50	39
Wadley ditch No. 1	Trout creek	May 1, 1875	4.78			599.74	40
Wadley ditch No. 2	Trout creek	May 1, 1875	11.66			604.52	41
Weed ditch	Middle Fork of South Platte	May 1, 1875	20			616.18	42
Sigafus ditch, first enlargement	Middle Fork of South Platte	May 1, 1875	25	50	17.14	636.18	43
Ratcliff ditch No. 3	Rock creek	May 1, 1875	4.06			661.18	44
Packer & Bonis ditch	Tarryall creek	May 15, 1875	1.60	1.60		665.24	45
Brubaker ditch	Jefferson creek	May 15, 1875	17.51			666.84	46
Parmelee & Shoemaker ditch No. 1	South Fork	May 20, 1875	30.54	30.54	O. K.	684.35	47
Anderson ditch No. 2	Middle Fork	May 25, 1875	10.45			714.89	48
Sadler ditch	Middle Fork of South Platte	May, 1875	49			725.34	49
Wadley ditch No. 3	Trout creek	June 1, 1875	3.25			774.34	50
Baker and Lilley ditch	Deadman's gluch	June 1, 1875	14.60			777.59	51
Tarryall ditch	Tarryall creek	June 15, 1875	7.90			792.19	52
Michigan ditch	Michigan creek	June 30, 1875	3.16			800.09	53
Holthusen ditch	No Name creek	July 1, 1875	1.31			803.25	54
Dunbar ditch	Tarryall creek	April 5, 1876	27			804.56	55
Hauxhurst ditch	Jefferson creek	April 25, 1876	12			831.56	56
McManus ditch	Tarryall creek	May 1, 1876	20			843.56	57
Prince ditch, first enlargement	Middle Fork of South Platte	May 10, 1876	45.60	55.60		863.56	58

STATEMENT CONCERNING DITCHES—Continued.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Actual maximum capacity, as determined by actual gagings	Cubic feet per second previously appropriated in district	Order of priority in district
Holst ditch No. 1	Tarryall creek	May 15, 1876	8.78			909.16	59
Hubbard ditch	South Fork of South Platte	May 22, 1876	19			917.94	60
Lee ditch No. 1	Rock creek	June 1, 1876	1.08			936.94	61
Parmelee & Shoemaker ditch No. 3	South Fork of South Platte	June 15, 1876	30.48		4.67	938.02	62
Island ditch	South Fork of South Platte	June 30, 1876	12.67			968.50	63
Haver ditch No. 2	South Fork of South Platte	July 1, 1876	29.98		15	981.17	64
Balm of Gilead ditch	Balm of Gilead creek	July 15, 1876	13.50			1 011.15	65
Foster ditch	Middle Fork of South Platte	July, 1876	42			1,024.65	66
Reinhardt ditch No. 4	Middle Fork of South Platte	Aug. 1, 1876	6.90			1,066.65	67
Crozier & Taylor ditch	Michigan creek	Oct. 1, 1876	31.74			1,073.55	68
Sigafus ditch, second enlargement	Middle Fork of South Platte	May 10, 1876	10	60	17.14	1,105.29	69
Holst & Packer ditch	Tarryall creek	Dec. 15, 1876	11.70			1,115.29	70
Milligan ditch	Four-Mile creek	May 1, 1877	17.55			1,126.99	71
Lee ditch No. 2	Rock creek	May 1, 1877	.50			1,144.54	72
Packer & Bonis ditch, first enlargement	Tarryall creek	May 14, 1877	4.60	6.20		1,145.04	73
Lavack ditch	Waste water from the Cincinnati ditch	May 15, 1877	8			1,149.64	74
Hot Springs ditch	South Fork of South Platte	May 15, 1877	28		13.06	1,157.64	75
Parmelee & Shoemaker ditch No. 2	South Fork of South Platte	June 1, 1877	44.30		25	1,185.64	76

Central ditch	Middle Fork of South Platte	June 1, 1877	33			1,229.94	77
Franks ditch	South Fork of South Platte	June 15, 1877	37.59		O. K.	1,262.94	78
Rock Creek ditch No. 1	Rock creek	June 30, 1877	1.35			1,300.53	79
Lavack ditch No. 2	Quackenasp gulch	July 1, 1877	3			1,301.88	80
Fritz ditch	Middle Fork of South Platte	July 1, 1877	24		5.54	1,304.88	81
Crooked Creek ditch	Crooked creek	1877	Entire flow				82
Ohler Gulch ditch	Ohler gulch	April 1, 1878	Entire flow				83
Fehringer ditch No. 2	Middle Fork of South Platte	April 20, 1878	13.40			1,328.88	84
Donovan ditch	Four-Mile creek	May 15, 1878	45			1,342.28	85
Harland ditch	Tarryall creek	May 20, 1878	27			1,387.28	86
Lavack ditch, first enlargement	Waste water from the Cincinnati ditch	May 28, 1878	2	10		1,414.28	87
Baker ditch	Guernsey gulch	June 15, 1878	Entire flow				88
Miller & Chapman ditch, first enlargement	Middle Fork of South Platte	June 20, 1878	2	12		1,416.28	89
Taylor ditch	Michigan creek	July 18, 1878	13.50			1,418.28	90
Randall ditch	Michigan creek	Aug. 1, 1878	27	27		1,431.78	91
Binkley ditch No. 2	Twelve-Mile creek	Aug. 1, 1878	20		12	1,458.78	92
Burlingame ditch	South Fork of South Platte	Aug. 10, 1878	27		23.55	1,478.78	93
Nelson ditch	Pennsylvania creek	April 1, 1879	27		4	1,505.78	94
Main or Hotel ditch	South Fork of South Platte	April 5, 1879	29		13	1,532.78	95
Thompson & Radcliff ditch	South Fork of South Platte	April 12, 1879	27		7.30	1,561.78	96
Holst ditch No. 2	Tarryall creek	April 30, 1879	11.70			1,588.78	97
O'Neill ditch	Tarryall creek	May 10, 1879	28.83			1,600.48	98
Rogers North ditch	Middle Fork of South Platte	May 15, 1879	84		17.36	1,629.31	99
Anchor ditch	Jefferson creek	May 20, 1879	21.40			1,713.31	100
Elisha Alden ditch	Middle Fork of South Platte	May 21, 1879	57.09		30.25	1,734.71	101

STATEMENT CONCERNING DITCHES—Continued.

NAME OF DITCH, CANAL, OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Actual maximum capacity, as determined by actual gagings	Cubic feet per second previously appropriated in district	Order of priority in district
Weed ditch	Middle Fork of South Platte	June 1, 1879	13.50			1,791.80	102
Cincinnati ditch	Michigan creek	June 20, 1879	13.50			1,805.30	103
Spring Branch ditch	A spring	July 1, 1879	Entire flow				104
Rayner and Edmondson ditch No. 2	Middle Fork of South Platte	July 15, 1879	25		7	1,818.80	105
Henry ditch	Mountain creek	July 25, 1879	1			1,843.80	106
Binkley ditch	East Branch of Twelve-Mile creek	Sept. 1, 1879	25		4.46	1,844.80	107
W. R. Head ditch	Jefferson creek	Sept. 1, 1879	27			1,869.80	108
Borden ditch, first enlargement	Tarryall creek, through Mill ditch	1879	5	15		1,896.80	109
Whitten ditch	Michigan creek	Mar. 15, 1880	15			1,901.80	110
Peabody ditch	Tarryall creek	April 20, 1880	3			1,916.80	112
Weaver ditch No. 1	South Fork of South Platte	May 1, 1880	1.35			1,919.80	113
Rogers ditch	South Fork of South Platte	May 10, 1880	42.74			1,921.15	114
Platte Station ditch	South Fork of South Platte	May 10, 1880	9	9	7.72	1,963.89	115
Slater ditch	Tarryall creek	May 20, 1880	27			1,972.89	116
Dunbar ditch No. 3	Tarryall creek	May 30, 1880	4			1,999.89	117
Petrie ditch	Tarryall creek	June 1, 1880	27			2,003.89	118
Ratcliff ditch No. 4	Rock creek	Juue 1, 1880	3.16			2,030.89	119
Holthausen ditch No. 1	Waste water of the Hopson ditch	June 1, 1880	1.35			2,034.05	120

Parmelee and Shoemaker ditch No. 1, first enlargement	South Fork of South Platte	June 1, 1880	9.30	39.84		2,035.40	121
Ratcliff ditch No. 5	Rock creek	June 9, 1880	3.16			2,044.70	122
Packer ditch	Tarryall creek	June 20, 1880	12			2,047.86	123
Pierce ditch	South Fork of South Platte	June, 1880	55		20.18	2,059.86	124
Heeley ditch No. 1	W. Branch of Twelve-Mile creek	July 1, 1880	11		9.20	2,114.86	125
Heeley ditch No. 2	E. Branch of Twelve-Mile creek	July 1, 1880	5.50		3.45	2,125.86	126
Sessions ditch	Michigan creek	July 31, 1880	13.50			2,131.36	127
Souders and Wolfe ditch No. 2	South Fork of South Platte	Aug. 1, 1880	1.86			2,144.86	128
Dunbar ditch No. 2	Tarryall creek	Aug. 1, 1880	4.05			2,146.72	129
Gibson ditch	Michigan creek	Sept. 15, 1880	1.60	1.60		2,150.77	130
Skelton ditch	Michigan creek	Nov. 1, 1880	10			2,152.37	131
Demick ditch, first enlargement	Michigan creek	April 1, 1881	10	24		2,162.37	132
Randall ditch, first enlargement	Michigan creek	April 1, 1881	27	54		2,172.37	133
Thompson ditch	Middle Fork of South Platte	April 2, 1881	31		O. K.	2,199.37	134
Anderson ditch	Middle Fork of South Platte	April 20, 1881	54.05			2,230.37	135
Reinhardt ditch No. 2	High creek	May 1, 1881	8.92			2,284.42	136
Reinhardt ditch No. 3	High creek	May 1, 1881	8.92			2,293.34	137
Harris ditch	Four-Mile creek	May 1, 1881	16.45			2,302.26	138
Love and Rayner ditch	Middle Fork of South Platte	May 8, 1881	8.10			2,318.71	139
Peabody ditch No. 2	Tarryall creek	May 10, 1881	4			2,326.81	140
D. F. Miller ditch No. 1	Middle Fork of South Platte	May 10, 1881	126.20			2,330.81	141
W. R. Head ditch No. 3	Jefferson creek	May 10, 1881	2.63			2,457.01	142
W. R. Head ditch No. 4	Jefferson creek	May 15, 1881	2.63			2,459.64	143
Platte Station ditch, first enlargement	South Fork of South Platte	May 15, 1881	2.45	11.45	7.72	2,462.27	144
Anderson & Brewer ditch	Tarryall creek	June 1, 1881	23.35			2,464.72	145

STATEMENT CONCERNING DITCHES—Continued.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Actual maximum capacity, as determined by actual gagings	Cubic feet per second previously appropriated in district	Order of priority in district
Dunbar ditch No. 1	Tarryall creek	Aug. 15, 1881	27			2,488.07	146
Lilley & Harriman ditch	Jefferson creek	Sept. 17, 1881	12			2,515.07	147
Western ditch	Middle Fork of South Platte	Oct. 1, 1881	66			2,527.07	148
Drake ditch	South Fork of South Platte	Oct. 10, 1881	6.27		O. K.	2,593.07	149
Demick ditch, second enlargement	Michigan creek	Mar. 1, 1882	10	34		2,599.34	150
Thoborg ditch	East Branch of Twelve-Mile creek	Mar. 20, 1882	15.50		1.75	2,609.34	151
Radford and Wright ditch	Twelve-Mile creek	Mar. 21, 1882	15			2,624.84	152
Garden ditch	Twelve-Mile creek	Mar. 23, 1882	11			2,639.84	153
Lassell ditch	Michigan creek	May 1, 1882	12			2,650.84	154
Ratcliff ditch No. 6	Rock creek	May 1, 1882	2.05			2,662.84	155
Ratcliff ditch No. 7	Rock creek	May 1, 1882	2.05			2,664.89	156
Little Channel ditch	Middle Fork of South Platte	May 1, 1882	8.10			2,666.94	157
Craig ditch	Jefferson creek	May 5, 1882	8.65			2,675.04	158
Bonnell ditch	Middle Fork of South Platte	May 8, 1882	27	27		2,683.69	159
Rogers South ditch	Middle Fork of South Platte	May 15, 1882	84			2,710.69	160
Weston ditch	Beaver creek	May 16, 1882	31.45			2,794.69	161
Ratcliff ditch No. 8	Rock creek	May 21, 1882	4.32			2,826.14	162
Ratcliff ditch No. 9	Rock creek	May 21, 1882	4.10			2,830.46	163

Divine Hill ditch	Middle Fork of South Platte	May, 1882	49	----------	----------	2,834.56	164
East Side ditch	West Branch of Twelve-Mile creek	June 1, 1882	18.70	----------	----------	2,883.56	165
Park ditch	Middle Fork of South Platte	June 10, 1882	60	----------	----------	2,902.26	166
Rayner & Edmondson ditch No. 1	Middle Fork of South Platte	June 10, 1882	20	----------	----------	2,962.26	167
Mikles ditch	Willow creek	June 10, 1882	20.55	----------	----------	2,982.26	168
Rayner & Edmondson ditch No. 5	Middle Fork of South Platte	June 14, 1882	20	----------	----------	3,002.81	169
Rayner & Edmondson ditch No. 3	Middle Fork of South Platte	June 15, 1882	5.85	----------	----------	3,022.81	170
Litmer ditch	Jefferson creek	June 15, 1882	2	----------	----------	3,028.66	171
Redmon ditch	South Fork of South Platte	June 20, 1882	13.40	----------	10	3,030.66	172
Rayner & Edmondson ditch No. 4	Middle Fork of South Platte	June 28, 1882	2	----------	----------	3,044.06	173
D. F. Miller ditch	Middle Fork of South Platte	July 5, 1882	15.76	----------	----------	3,046.06	174
Gibson ditch, first enlargement	Michigan creek	July 25, 1882	1.10	2 70	----------	3,061.82	175
Four-Mile ditch	Four-Mile creek	Aug. 20, 1882	5.40	----------	----------	3,062.92	176
Harrington South ditch	Middle Fork of South Platte	Sept. 15, 1882	43	----------	----------	3,068.32	177
Rickards Lower ditch	Middle Fork of South Platte	Sept. 15, 1882	45	----------	5.38	3,111.32	178
Sheep Rock ditch	Jefferson creek	Nov. 1, 1882	11.70	----------	----------	3,156.32	179
St. Charles ditch	Michigan creek	April 25, 1883	6	----------	----------	3,168.02	180
Dudley ditch	Four-Mile creek	May 10, 1883	16.21	----------	----------	3,174.02	181
O'Brien ditch	Middle Fork of South Platte	May 20, 1883	6.50	----------	----------	3,190.23	182
Shaffinger ditch	Michigan creek	June 1, 1883	2.16	----------	----------	3,196.73	183
Weaver ditch No. 2	South Fork of South Platte	July 1, 1883	1	----------	----------	3,198.89	184
W. H. Miller ditch	Michigan creek	Oct. 15, 1883	2	----------	----------	3,199.89	185
Litmer ditch, first enlargement	Jefferson creek	Nov. 13, 1883	4	6	----------	3,201.89	186
Beaver creek ditch	Beaver creek	Dec. 28, 1883	16	----------	----------	3,205.89	187
Rebecca ditch	Michigan creek	May 1, 1884	5	----------	----------	3,221.89	188

STATEMENT CONCERNING DITCHES—Concluded.

NAME OF DITCH, CANAL OR RESERVOIR	Stream from Which Water Is Taken	Date of appropriation	Cubic feet of water per second and decreed to each priority	Summation of decrees to each ditch, canal or reservoir	Actual maximum capacity, as determined by actual gagings	Cubic feet per second previously appropriated in district	Order of priority in district
Park Gulch ditch	Park gulch	May 8, 1884	6.08			3,226.89	189
Four-Mile ditch, first enlargement	Four-Mile creek	May 11, 1884	3.75	18.75	7.35	3,232.97	190
Harlan Extension ditch	Waste water from the Harlan ditch	May 15, 1884	4.32			3,236.72	191
Lee ditch No. 3	Rock creek	May 15, 1884	.37			3,241.04	192
Mexican ditch	South Fork of South Platte	May 17, 1884	13			3,241.41	193
Lee ditch No. 4	Rock creek	May 21, 1884	.37			3,254.41	194
Chubb ditch	Green's lake	June 1, 1884	91.52			3,254.78	195
Kenosha ditch	Kenosha creek	July 8, 1884	8			3,346.30	196
Harrington & Rickards ditch	Middle Fork of South Platte	Oct. 15, 1884	94		24.55	3,354 30	197
Nelson High Creek ditch	High creek	Mar. 15, 1885	10			3,448.30	198
McCartney ditch	Tarryall creek	May 20, 1885	75			3,458.30	199
Link ditch	Tarryall creek	May 20, 1885	19			3,533.30	200
Island ditch	Middle Fork of South Platte	May 20, 1885	8.11			3,552.30	201
Hartsel Four-Mile ditch	Four-Mile creek	June 8, 1885	22			3,560.41	202
W. R. Head ditch No. 2	Jefferson creek	June 10, 1885	.37			3,582.41	203
Montag & Truax ditch	Tarryall creek	June 15, 1885	25			3,582.78	204
Alkaline ditch	Middle Fork of South Platte	July 1, 1885	27		3.90	3,607.78	205
Peabody ditch No. 3	Tarryall creek	May 15, 1886	10			3,634.78	206

Souders & Wolfe ditch No. 4	South Fork of South Platte	June 12, 1886	3.21			3,644.78	207
Sacramento ditch	Sacramento creek	July 27, 1886	60		4.50	3,647.99	208
Como Jim ditch	Middle Fork of South Platte	Oct. 1, 1886	84			3,707.99	209
Haver ditch No. 3	South Fork of South Platte	May 1, 1887	20.47		12.20	3,791.99	210
Peart Lower ditch	Four-Mile Creek	May 15, 1887	35		5.64	3,812.46	211
" Ditch " ditch	Middle Fork of South Platte	May 24, 1887	50			3,847.46	212
Souders & Wolfe ditch No. 6	South Fork of South Platte	May 25, 1887	11.68		O. K.	3,897.46	213
Souders & Wolfe ditch No. 3	South Fork of South Platte	June 5, 1887	2.17			3,909.14	214
Souders & Wolfe ditch No. 5	South Fork of South Platte	June 20, 1887	2.55			3,911.31	215
Trevan Upper ditch	Sacramento creek	June 27, 1887	30		.70	3,913.86	216
John Radford ditch	Twelve-Mile creek	July 1, 1887	12			3,943.86	217
Bonnell ditch, first enlargement	Middle Fork of South Platte	May 15, 1888	6.75	33.75		3,955.86	218
Trevan Lower ditch	Sacramento creek	July 9, 1887	30			3,962.61	219
Weaver ditch No. 3	South Fork of South Platte	July 12, 1887	1.35			3,992.61	220
W. H. Miller ditch No. 2	Michigan creek	April 20, 1888	1.35			3,993.96	221
Burlingame ditch No. 2	South Fork of South Platte	June 1, 1888	1.62			3,995.31	222
Burlingame ditch No. 3	South Fork of South Platte	June 10, 1888	1.62			3,996.93	223
Peart Upper ditch	Four-Mile creek	June 15, 1888	30		5	3,998.55	224
Hopson ditch, first enlargement	Unnamed stream		.60	6		4,028.55	225
Hubbard ditch No. 2	South Fork of South Platte	June 15, 1888	30			4,029.15	226
Jefferson Lake ditch	Jefferson lake	June 25, 1888	546			4,059.15	227
Ohler ditch	Jefferson creek	June 25, 1888	30			4,605.15	228
				Total in	district	4,635.15	

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 23, AS THEY HAVE BEEN MODIFIED SINCE THE STATEMENT PUBLISHED IN THE "FIFTH BIENNIAL REPORT," PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.

NAME OF DITCH OR CANAL	Source of Appropriation	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
Randall and Nichols ditch	Michigan creek	Oct. 14, 1874	10	----------	483.14	34
Demick ditch	Michigan creek	Apr. 12, 1875	8	----------	506.60	37
Michigan ditch	Michigan creek	June 30, 1875	2	----------	756.09	53
Crozier and Taylor ditch	Michigan creek	Oct. 1, 1876	12.35	----------	1,028.39	68
Taylor ditch	Michigan creek	July 18, 1878	18.76	----------	1 353.73	90
Randall ditch	Michigan creek	May 1, 1878	11.75	----------	1,372.51	91*
Cincinnati ditch	Michigan creek	June 20, 1879	9.42	----------	1,730.78	105
Whitten ditch	Michigan creek	Mar. 15, 1880	11.42	----------	1,823.20	110
Sessions ditch	Michigan creek	July 30, 1880	3.50	----------	2,049.18	127
Gibson ditch	Michigan creek	Sept. 15, 1880	2.46	----------	2,058.59	130
Skelton ditch	Michigan creek	Nov. 1, 1880	6.50	----------	2,061.05	131
Demick ditch, first enlargement	Michigan creek	Apr. 1, 1881	4	12	2,067.55	132
Randall ditch, first enlargement	Michigan creek	Apr. 1, 1881	11.75	23.50	2,071.55	133*
Mesa ditch	Michigan creek	Nov. 15, 1881	5	----------	2,483.27	149a
Demick ditch, second enlargement	Michigan creek	May 1, 1882	4	16	2,488.27	150

Lasell ditch	Michigan creek	May 1, 1882	9.60		2,533.77	154
Gibson ditch, first enlargement	Michigan creek	July 25, 1882	2	4.46	2,912.35	175
Malice ditch	Four-Mile creek	April 23, 1890	30		4,516.58	229
Jasper ditch	South Platte river	June 11, 1891	30		4,546.58	230
Rogers ditch	High creek	June 1, 1884	14.30		4,576.58	231*
Henry Clark No. 1 ditch	West creek	April 5, 1880	3		4,590.88	232*
Henry Clark No. 2 ditch	West creek	May 10, 1880	3		4,593.88	233*
Henry Clark No. 3 ditch	Trail creek	May 20, 1882	2.66		4,596.88	234*
Henry Clark No. 4 ditch	Trail creek	June 4, 1882	2.66		4 599.54	235*
Fremont irrigating ditch	Tarryall creek	July 1, 1889	20		4,602.20	236*
				Total	4,622.20	

* Priority number as given in decree.

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 46, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.

NAME OF DITCH	Source of Supply	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
Little Grizzly ditch	Little Grizzly river	May 7, 1881	2.50	----------	----------	1
Peterson ditch	Big Grizzly river	June 1, 1882	6	----------	2.50	2
Marr ditch	Little Grizzly river	April 12, 1883	9	----------	8.50	3
Koping ditch	Big Grizzly river	May 12, 1883	4.50	----------	17.50	4
Newcomb ditch	Little Grizzly river	May 31, 1883	2	----------	22	5
Little Grizzly ditch	Little Grizzly river	May 31, 1883	8	10.50	24	6
Peterson ditch No. 2	Big Grizzly river	July 1, 1883	4.50	10.50	32	7
Chedsey No. 1 ditch	Skull creek	July 1, 1883	1	----------	36.50	8
Peterson ditch No. 1	Little Grizzly river	May 20, 1884	3.50	----------	37.50	9
West Fork ditch	North Fork of Platte river	May 29, 1884	12	----------	41	10
Badger State ditch	Coyote creek	June 20, 1884	5	----------	53	11
Timber ditch	Hell creek	Oct. 1, 1884	1.50	----------	58	12
Newcomb ditch	Little Grizzly river	Dec. 20, 1884	.50	2.50	59	13
East Buffalo ditch	Buffalo creek	April 30, 1885	1.50	----------	59.50	14
Nairn ditch	Little Grizzly river	May 1, 1885	14.50	----------	61	15

Damfino ditch	Big Grizzly river	May 15, 1885	2.50		75.50	16
Alexis ditch No. 1	Coyote creek	June 1, 1885	7.50		78	17
Arapahoe ditch	Arapahoe creek	June 1, 1885	8		85.50	18
Addison ditch	Buffalo creek	June 15, 1885	5		93.50	19
Boulder ditch	Lone River creek	June 15, 1885	1		98.50	20
Jennie ditch	Little Grizzly river	June 23, 1885	5		99.50	21
Butler ditch	North Fork of Cheyenne creek	July 5, 1885	2		104.50	22
Chedsey No. 1 ditch	Skull creek	July 31, 1885	3	4	106.50	23
Lawrence ditch	Arapahoe creek	Apr. 26, 1886	2		109.50	24
Big Grizzly ditch	Big Grizzly river	Apr 30, 1886	10		111.50	25
Little Nellie ditch	North Fork of North Platte river	Apr. 30, 1886	3.50		121.50	26
Edith ditch	Cheyenne creek	May 1, 1886	7.50		125	27
West Buffalo ditch	Buffalo creek	May 25, 1886	6		132.50	28
Spicer ditch	Big Grizzly river	May 31, 1886	2		138.50	29
Chapman ditch	North Fork of Little Grizzly river	May 31, 1886	4		140.50	30
Damfino ditch	Big Grizzly river	June 30, 1886	2.50	5	144.50	31
West Fork ditch	North Fork of Platte river	Aug. 31, 1886	7	19	147	32
969 ditch	Big Grizzly river	Apr. 1, 1887	2		154	33
Dalom ditch	North Platte river	Apr. 15, 1887	2.50		156	34
Lawrence ditch No. 1	Indian creek	Apr. 15, 1887	5		158.50	35
Lorena ditch	North Platte river	Apr. 15, 1887	4		163.50	36
Cochrane ditch	Coyote creek	Apr. 20, 1887	2		167.50	37
Little Nellie ditch	North Fork of North Platte river	Apr. 30, 1887	14	17.50	169.50	38
Marr ditch No. 2	Bear ~~Little~~ Grizzly river	May 1, 1887	10		183.50	39
Darling ditch	Little Grizzly river	May 1, 1887	8		193.50	40

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 46, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.—(Continued.)

NAME OF DITCH	Source of Supply	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
Dora ditch	Cheyenne creek	May 1, 1887	5	----------	201.50	41
Mellin ditch	Buffalo creek	May 3, 1887	2.50	----------	206.50	42
Willow ditch	Arapahoe creek	May 5, 1887	6	----------	209	43
~~L~~eymour ditch Seymore	Big Grizzly river	May 10, 1887	1.50	----------	215	44
Antelope ditch	Little Grizzly river	May 15, 1887	3.50	----------	218.50	45
Butler ditch	Cheyenne creek	May 15, 1887	2.50	----------	221	46
Moore ditch No. 4	Roaring Fork	May 15, 1887	3.50	----------	224.50	47
Arapahoe ditch	Arapahoe creek	May 15, 1887	11	19	228	48
Poled Angus ditch	Buffalo creek	May 17, 1887	4	----------	239	49
Chapman ditch	North Fork of Little Grizzly river	May 31, 1887	2	6	243	50
Butler ditch No. 2	Cheyenne creek	June 1, 1887	1.50	----------	245	51
Timber ditch	Hell creek	June 5, 1887	2.50	4	246.50	52
Castle ditch	Big Grizzly river	June 15, 1887	2.50	----------	249	53
Brooke ditch	Buffalo creek	June 15, 1887	3.50	----------	251.50	54
Little Grizzly ditch	Little Grizzly river	Sept. 1, 1887	14.50	25	255	55

Wisconsin ditch	Buffalo creek	Sept. 30, 1887	7.50		269.50	56
Slack ditch	Buffalo creek	April 15, 1888	9		277	57
Dalom ditch	North Platte river	April 15, 1888	5.50	8	286	58
Mallow ditch	Roaring Fork	April 20, 1888	24		291.50	59
Van Patten ditch	Buffalo creek	April 20, 1888	3		315.50	60
Wolfer ditch	Roaring Fork	May 8, 1888	6		318.50	61
Staples ditch No. 1	Little Grizzly river	May 10, 1888	10		324.50	62
Clifton ditch	Buffalo creek	May 15, 1888	2		334.50	63
Butler ditch No. 2	Cheyenne creek	May 15, 1888	1		336.50	64
Butler ditch	Beaver creek	May 15, 1888	2.50		337.50	65
Newcomb ditch	Little Grizzly river	May 31, 1888	12.50	15	340	66
Spicer ditch	Big Grizzly river	May 31, 1888	10	12	352.50	67
Forrest ditch	Lost creek	June 1, 1888	.50		362.50	68
Mitchell ditch	Cheyenne creek	June 10, 1888	8		363	69
Nile ditch	North Platte river	June 15, 1888	8		371	70
Boulder ditch	Lone Pine creek	June 15, 1888	7	8	379	71
Lorena ditch	North Platte river	July 16, 1888	3.50	7.50	386	72
Mitchell ditch	Cheyenne creek	Sept. 10, 1888	7	15	389.50	73
Mallow ditch	Roaring Fork	Oct. 31, 1888	13.50	37.50	396.50	74
Marr No. 1 ditch	Little Grizzly river	Mar. 25, 1889	8.50	17.50	410	75
Spicer ditch, enlargement	Little Grizzly river	Mar. 31, 1889	8		418.50	76
Bennett & Leshmer ditch	Little Grizzly river	April 2, 1889	13		426.50	77
Hodgson ditch	Cheyenne creek	April 10, 1889	5		439.50	78
Staples ditch, enlargement	Little Grizzly river	April 15, 1889	20		444.50	79
Higo ditch	Roaring Fork	April 18, 1889	2.50		464.50	80

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 46, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.—(Concluded.)

NAME OF DITCH	Source of Supply	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
Larson ditch	Big Grizzly river	May 10, 1889	4	....	467	81
Antelope ditch	Little Grizzly river	May 10, 1889	8.50	12	471	82
Ernest ditch	Cheyenne creek	May 15, 1889	2.50	....	479.50	83
Leymour ditch No. 1	Big Grizzly river	May 25, 1889	3	....	482	84
Legal Tender ditch	North Fork of North Platte river	June 1, 1889	7	....	485	85
Luckpenny ditch	Beaver creek	June 1, 1889	15	....	492	86
Chedsey ditch	South Fork of Little Grizzly river	June 3, 1889	3	....	507	87
Norris ditch	South Fork of Roaring Fork	June 10, 1889	2.50	....	510	88
Reithmeyer ditch	North Fork of North Platte river	June 20, 1889	5	....	512.50	89
Jennie ditch	Little Grizzly river	June 23, 1889	7	12	517.50	90
Koping ditch	Big Grizzly river	June 25, 1889	2	6.50	524.50	91
Roaring ditch	South Fork of North Platte river	Oct. 7, 1889	5	....	526.50	92
Higho ditch	Roaring Fork	May 8, 1890	2	4.50	531.50	93
Staples extension and enlargement	Little Grizzly river	May 15, 1890	5	25	533.50	94
Chedsey ditch No. 2	Cheyenne creek	June 3, 1890	2	....	538.50	95

Norris ditch	South Fork of Roaring Fork	June 10, 1890	2.50	5	540.50	96
Chapman ditch	Little Grizzly river	June 19, 1890	5	11	543	97
Forrest ditch	Lost creek	Aug. 31, 1890	2	2.50	548	98
Brukey ditch	Little Grizzly river	Sept. 30, 1890	10	----------	550	99
				Total	560	

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 47, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.

NAME OF DITCH	Source of Supply	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
Owl ditch	Owl creek	May 15, 1880	2	....	2	1
Capron ditch	Pinkham creek	June 21, 1881	2	....	4	2
Kerr ditch	Little Willow creek	May 10, 1882	1	....	4	3
Oliver ditch	Little Willow creek	May 15, 1882	1	....	5	4
J. W. Sutton ditch	E. Fork Willow creek	May 20, 1882	4	....	6	5
Hanover ditch	Big Willow creek	June 1, 1882	1	....	10	6
Coe ditch No. 2	Government creek	June 21, 1882	1	....	11	7
Coe ditch No. 1	Government creek	June 21, 1882	1.50	....	12	8
Cochrane ditch	Big Willow creek	June 21, 1882	1	....	13.50	9
Home ditch No. 1	Illinois river	May 6, 1883	4	....	14.50	10
North Park ditch No. 2	Spring creek	May 15, 1883	3	....	18.50	11
Newport ditch	Pinkham creek	May 31, 1883	2	....	21.50	12
Endomile ditch	Illinois river	June 1, 1883	2	....	23.50	13
Government ditch No. 1	Government creek	June 30, 1883	4	....	25.50	14
Flying Dutchman ditch	Illinois river	June 1, 1884	2.50	....	29.50	15

Weed ditch	Illinois river	June 1, 1884	2.50		32	16
Coe ditch No. 1	Government creek	June 21, 1884	1.50	3	34 50	17
Salem ditch	Big Willow creek	June 30, 1884	1.50		36	18
Coe ditch No. 2	Government creek	July 1, 1884	1	2	37.50	19
Moore ditch	Government creek	Aug. 1, 1884	1		38.50	20
Sherman ditch	Sherman creek	Oct. 15, 1884	4		39.50	21
Chace ditch	Sherman creek	Oct. 31, 1884	10		43.50	22
Hi Ho ditch	Michigan creek	April 1, 1885	6		53.50	23
Buckey ditch	Michigan river	April 15, 1885	2		59.50	24
Seneca ditch	Michigan river	April 15, 1885	1		61.50	25
Mathews ditch	Michigan river	May 1, 1885	8		62.50	26
Donelson ditch	Little Willow creek	May 4, 1885	6		70.50	27
Monroe ditch	Illinois river	May 5, 1885	3.50		76 50	28
Livingstone ditch	Government creek	May 10, 1885	1		80	29
William Kerr ditch	Elk creek	May 15, 1885	3		81	30
Lower Waldon ditch	Michigan river	May 15, 1885	6.50		84	31
Jakey ditch	Michigan river	May 15, 1885	3		90.50	32
Shearer ditch	Willow creek	May 16, 1885	3		93.50	33
Yocum ditch No. 1	Sherman creek	May 31, 1885	1.50		96.50	34
Ruction ditch	Michigan river	May 31, 1885	3		98	35
Big Willow ditch	Big Willow creek	June 1, 1885	5		101	36
Yocum No 2 ditch	Sherman creek	June 1, 1885	2		106	37
North Park ditch No. 3	Mendenhall creek	June 5, 1885	3		108	38
Home ditch No 2	Illinois river	June 10, 1885	4		111	39
Peabody ditch	Willow creek	June 15, 1885	7.50		115	40

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 47, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.—(Continued.)

NAME OF DITCH	Source of Supply	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
Lowland ditch	Owl creek	June 15, 1885	2	....	122.50	41
Hamilton ditch	Spring creek	June 20, 1885	2	....	124.50	42
Coe ditch No. 2	Government creek	July 1, 1885	2	4	126.50	43
Snide ditch	Little Willow creek	July 1, 1885	1	....	128.50	44
Moore ditch	Government creek	Oct. 1, 1885	2	3	129.50	45
Mansfield ditch No. 1	Michigan river	April 1, 1886	1	....	131.50	46
Seneca ditch	Michigan river	April 12, 1886	2	3	132.50	47
Shearer ditch	Willow creek	April 14, 1886	1	....	134.50	48
Soldiers ditch	Owl creek	April 30, 1886	2	....	135.50	49
Richmond ditch	Michigan river	May 5, 1886	4	....	137.50	50
Bona Fide ditch	Canadian river	May 10, 1886	2	....	141.50	51
James W. Sutton ditch	East Fork of Willow creek	May 15, 1886	3	....	143.50	52
Michigan High Line ditch	Michigan river	May 31, 1886	1.50	....	146.50	53
Edith ditch	Michigan river	May 31, 1886	2	....	148	52
Pioneer ditch	Illinois river	May 31, 1886	10	....	150	55

St. Francis No. 1 ditch	Yocum creek	May 31, 1886	2		160	56
Suddith ditch	Cabin creek	June 1, 1886	4		162	57
St. Francis No. 2 ditch	Yocum creek	June 5, 1886	1		166	58
St. Francis ditch	Owl creek	June 21, 1886	2	4	167	59
Government ditch No. 2	Government creek	June 21, 1886	8		169	60
Fernando ditch	Cabin creek	June 30, 1886	3		177	61
J. W. Sutton ditch	East Fork of Willow creek	June 30, 1886	4	8	180	62
Victor ditch	East Fork of Big Willow creek	June 30, 1886	1		184	63
Stevenson ditch	Willow creek	June 30, 1886	1		185	64
Mathews ditch	Michigan river	Mar. 31, 1887	6	14	186	65
Midland ditch	Illinois river	April 1, 1887	14		192	66
Cumberland ditch	Michigan river	April 1, 1887	3		206	67
North Park ditch No. 5	Michigan river	April 5, 1887	4		209	68
Moore ditch, No. 2	Michigan river	April 15, 1887	8		213	69
Landhurst ditch	Spring creek	April 25, 1887	1.50		221	70
Allen ditch	Allen or Willow creek	April 25, 1887	2		222.50	71
Buckeye ditch	Michigan river	April 30, 1887	6	8	224.50	72
Coon Creek ditch	Coon creek	April 30, 1887	5		230.50	73
Stella ditch	Illinois river	April 30, 1887	4		235.50	74
Kerr ditch	Willow creek	April 30, 1887	1	2	239.50	75
Leonard ditch	Illinois river	April 30, 1887	5		240.50	76
Seneca ditch, enlargement	Michigan river	May 1, 1887	4		245.50	77
North Park ditch No. 6	Illinois river	May 1, 1887	9		249.50	78
Dora ditch	East Willow creek	May 5, 1887	1		258.50	79
Everhard & Baldwin ditch	Illinois river	May 8, 1887	10		259.50	80

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 47, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.—(Continued.)

NAME OF DITCH	Source of Supply	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
Hanover ditch	Big Willow creek	May 15, 1887	3.50	4.50	269.50	81
Stevenson ditch	Willow creek	May 15, 1887	5		273	82
Ish & Everhard ditch	Illinois river	May 24, 1887	6		278	83
Rarus ditch	Spring creek	May 31, 1887	2		284	84
Michigan High Line ditch	Michigan river	May 31, 1887	1	2.50	286	85
Richmond ditch	Michigan river	May 31, 1887	2	6	287	86
North Park ditch No. 4	Michigan river	June 4, 1887	8		289	87
Harry Haddon ditch	Government creek	June 10, 1887	1		297	88
Wyckoff ditch	Little Willow creek	June 14, 1887	1.50		298	89
Salem ditch	Big Willow creek	June 15, 1887	2.50	4	299.50	90
Walker ditch	Pinkham creek	June 21, 1887	2		302	91
Capron ditch	Pinkham creek	June 21, 1887	2	4	304	92
Hubbard ditch	Illinois river	June 21, 1887	1		306	93
Bona Fide ditch	Canadian river	June 29, 1887	2	4	307	94
Bostwick ditch	Michigan river	June 30, 1887	2.50		309	95

Fernando ditch	Cabin creek	July 1, 1887	2	5	311.50	96
Moore ditch	Pinkham creek	Sept. 1, 1887	3		313.50	97
Sanborn ditch	Canadian river	Sept. 26, 1887	10		316.50	98
Moore ditch	Government creek	Oct. 1, 1887	1	4	326.50	99
Shearer ditch	Willow creek	Nov. 1, 1887	1	4	327.50	100
Hubbard ditch No. 1	Illinois river	Dec. 1, 1887	3	4	328.50	101
Champion ditch	Michigan river	Apr. 15, 1888	1.50		331.50	102
Mansfield ditch No. 2	Michigan river	Apr. 15, 1888	1.50		333.50	103
Ish ditch	West Fork of Big Willow creek	Apr. 15, 1888	2		334.50	104
Ottawa ditch	Illinois river	Apr. 20, 1888	1.50		336.50	105
Cleveland ditch	Michigan river	Apr. 30, 1888	5.50		338	106
Oxford ditch	Government creek	Apr. 30, 1888	1.50		343.50	107
Squibob ditch	Michigan river	Apr. 30, 1888	6		345	108
Lizzie ditch	Elk creek	May 15, 1888	1		351	109
Park ditch	Illinois river	May 15, 1888	3.50		352	110
School Section ditch	East Fork of Willow creek	May 15, 1888	6		355.50	111
Ivey ditch	Jack creek	May 15, 1888	5		361.50	112
Ward ditch No. 1	Illinois river	May 15, 1888	3		366.50	113
Terrell ditch	Michigan river	May 16, 1888	3		369.50	114
Poverty Flat ditch	Michigan river	May 20, 1888	3		372.50	115
Slew ditch	Illinois river	May 21, 1888	4		375.50	116
Cal. Davis ditch	Michigan river	May 25, 1888	4		379.50	117
Howard ditch	Willow creek	May 25, 1888	8		387.50	118
Spaulding ditch	Pinkham creek	May 27, 1888	1		395.50	119
Overland ditch	Michigan river	May 31, 1888	6		396.50	120

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 47, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.—(Continued.)

NAME OF DITCH	Source of Supply	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
Mansfield ditch	Michigan river	May 31, 1888	2	3	402.50	121
Maggie ditch	Allen creek	June 1, 1888	3.50		404.50	122
Seneca ditch, enlargement	Michigan river	June 1, 1888	1	5	408	123
Flying Dutchman ditch	Illinois river	June 1, 1888	6.50	9	409	124
Troy ditch	Owl creek	June 1, 1888	5		415.50	125
Rattler ditch	Willow creek	June 2, 1888	2		420.50	126
No. 1 ditch	Jack creek	June 2, 1888	3		422.50	127
Martin ditch	Michigan river	June 14, 1888	3		425.50	128
Wyckoff ditch	Little Willow creek	June 14, 1888	1	2.50	428.50	129
Jackey ditch	Michigan river	June 15, 1888	2	5	429.50	130
Salem ditch	Big Willow creek	June 15, 1888	2	6	431.50	131
Soldiers' Home ditch	Owl creek	June 21, 1888	2	4	433.50	132
Moore ditch No. 3	Michigan river	June 21, 1888	6		435.50	133
Dora ditch	East Willow creek	June 21, 1888	2	3	441.50	134
Hanover ditch	Big Willow creek	June 21, 1888	1.50	6	443.50	135

Midland ditch	Illinois river	June 22, 1888	6	20	445	136
Crystal Spring ditch	Crystal Spring creek	June 22, 1888	1		451	137
Fernando ditch	Cabin creek	July 1, 1888	1	6	452	138
North Park ditch No. 7	Michigan river	Aug. 3, 1888	4		453	139
William Kerr ditch	Elk creek	Aug. 15, 1888	5	8	457	140
Saint Francis No. 7	Christy creek	Sept. 4, 1888	6		462	141
Saint Francis No. 1 ditch	Yocum creek	Sept. 5, 1888	2	4	468	142
Boomerang ditch	Michigan river	Sept. 14, 1888	1		470	143
Cal. Davis ditch	Michigan river	Sept. 20, 1888	4	8	471	144
Saint Francis No. 2	Yocum creek	Sept. 20, 1888	2	3	475	145
Matthews Eastern ditch	Michigan river	Sept. 30, 1888	1		477	146
Kiwa ditch	Michigan river	Oct. 17, 1888	1		481	147
Poverty Flat ditch	Michigan river	Nov. 1, 1888	7	10	482	148
Poquette ditch	Michigan river	Nov. 15, 1888	1.50		489	149
Cumberland ditch	Michigan river	Mar. 19, 1889	6	9	490.50	150
Hubbard ditch No. 2	Illinois river	April 2, 1889	3		496.50	151
Alma ditch	Michigan river	April 4, 1889	4		499.50	152
Olive ditch	Illinois river	April 15, 1889	2		503.50	153
Bona Fide No. 2 ditch	Canadian river	April 20, 1889	3		505.50	154
Park View ditch	Illinois river	April 20, 1889	1.50		508.50	155
Matthews Eastern ditch	Michigan river	April 30, 1889	2	6	510	156
Rattler ditch	Willow creek	April 30, 1889	.50	2.50	512	157
Lowland ditch, enlargement	Owl creek	April 30, 1889	1		512.50	158
Ruction ditch	Michigan creek	May 1, 1889	3	6	513.50	159
Toledo ditch	Allen creek	May 5, 1889	3		516.50	160

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 47, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.—(Continued.)

NAME OF DITCH	Source of Supply	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
Upland ditch	Illinois river	May 5, 1889	2	....	519.50	161
No. 1 ditch	Jack creek	May 6, 1889	1	4	521.50	162
Big Willow, enlargement	Big Willow ditch	May 15, 1889	1	....	522.50	163
Stevenson ditch No. 4	Willow creek	May 15, 1889	6	....	523.50	164
Wycoff ditch	West Fork of Big Willow creek	May 17, 1889	2	....	529.50	165
Kiwa ditch	Michigan river	May 25, 1889	1	2	531.50	166
Boomerang ditch	Michigan river	May 31, 1889	1	2	532.50	167
Old S. C. ditch	Michigan river	June 1, 1889	7	....	533.50	168
Seneca ditch, enlargement	Michigan river	June 1, 1889	1	6	540.50	169
Ward ditch No. 2	Illinois river	June 7, 1889	1.50	....	541.50	170
Martin ditch	Michigan river	June 14, 1889	1	4	543	171
Salem ditch	Big Willow creek	June 15, 1889	2	8	544	172
Dora ditch	East Willow creek	June 21, 1889	3	6	546	173
Poqnette ditch	Michigan river	June 21, 1889	1.50	2	549	174
Ward ditch No. 1	Illinois river	June 21, 1889	3	6	550.50	175

Hubbard ditch No. 1	Illinois river	June 21, 1889	2	6	553.50	176
Poverty Flat ditch No. 2	South Fork of Michigan river	June 21, 1889	10		555.50	177
Spaulding ditch	Pinkham creek	June 21, 1889	.50	1.50	565.50	178
Michigan High Line	Michigan river	June 22, 1889	5.50	8	566	179
Bona Fide ditch	Canadian river	June 29, 1889	2	6	571.50	180
Coon Creek ditch	Coon creek	June 30, 1889	1	6	573.50	181
Dulang ditch	Coon creek	June 30, 1889	2.50		574.50	182
Ottawa ditch	Illinois river	June 30, 1889	2.50	4	577	183
Buckey ditch	Michigan river	Sept. 11, 1889	3	11	579.50	184
Kermode ditch	Canadian river	Sept. 15, 1889	1.50		582.50	185
Gillette ditch	Clear creek	Sept. 15, 1889	1		584	186
Lizzie ditch	Elk creek	Sept. 23, 1889	.50	1.50	585	187
Pomroy ditch	Canadian river	Sept. 30, 1889	12		585.50	188
Hard Wood ditch	Pinkham creek	Sept. 30, 1889	3.50		597.50	189
Gillette ditch No. 1	Muddy creek	Oct. 15, 1889	1.50		601	190
Monroe ditch	Illinois river	Dec. 17, 1889	2.50	6	602.50	191
Carleton ditch	Michigan river	April 20, 1890	3		605	192
Donelson ditch	Little Willow creek	April 30, 1890	4	10	608	193
Michigan High Line	Michigan river	April 30, 1890	8	16	612	194
Bager ditch	Canadian river	April 30, 1890	1.50		620	195
Hubbard ditch No. 2	Minois river	May 1, 1890	3	6	621.50	196
Matthews Eastern ditch	Michigan river	May 16, 1890	2	8	624.50	197
Teller ditch	Jack creek	May 20, 1890	2		626.50	198
No. 1 ditch	Jack creek	May 20, 1890	1	5	628.50	199
Givedam Jones ditch	Canadian river	May 20, 1890	4		629.50	200

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 47, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES—(Concluded.)

NAME OF DITCH	Source of Supply	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
Stevenson ditch No. 2, enlargement	Stevenson ditch No. 2	May 23, 1890	3	----------	633.50	201
Ish ditch, enlargement	Ish ditch	May 26, 1890	1	----------	636.50	202
Poqnette ditch	Michigan river	May 27, 1890	1	3	637.50	203
Old S. C. ditch	Michigan river	June 1, 1890	14	21	638.50	204
Wyckoff ditch	Little Willow creek	June 14, 1890	1.50	4	652.50	205
Poverty Flat ditch No. 2	South Fork of Michigan river	June 21, 1890	14	24	654	206
Upland ditch	Illinois river	July 14, 1890	2	4	668	207
Lowland ditch, extension	Owl creek	June 15, 1890	1	2	670	208
Squibob ditch	Michigan river	July 17, 1890	2	8	671	209
Poverty Flat ditch	Michigan river	July 17, 1890	10	20	673	210
Fernando ditch	Cabin creek	July 26, 1890	2	8	683	211
Wales ditch	Michigan ditch	Sept. 30, 1890	6	----------	685	212
Kermode ditch	Canadian river	May 25, 1891	3.50	5	691	213
Givedam Jones ditch	Canadian river	June 17, 1891	2	6	694.50	214
Oklahoma ditch	Illinois river	June 25, 1891	10	----------	696.50	215

Novelty ditch	Saint Francis creek	June 25, 1891	8		706.50	216
Gillette ditch No. 3	Willow creek	June 25, 1891	8		714.50	217
Gillette ditch No. 1	Muddy creek	June 25, 1891	1.50	3	722.50	218
Gillette ditch No. 2	Clear creek	June 25, 1891	3	4	724	219
Ruction ditch	Michigan river	June 25, 1891	2	8	727	220
North Park ditch No. 7	Michigan river	June 25, 1891	6	10	729	221
North Park ditch No. 5	Michigan river	June 25, 1891	4	8	735	222
				Total	743	

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 48, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.

NAME OF DITCH OR CANAL	Source of Appropriation	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
Mansfield No. 2 ditch	Big Laramie river	June 1, 1880	19.84	....	....	1
Hills ditch	Big Laramie river	June 1, 1880	11	....	19.84	2
Warren ditch	Big Laramie river	Mar. 25, 1881	6.67	....	30.84	3
Hance ditch	Grace creek	Mar. 31, 1881	19.44	....	37.51	4
Stuck Creek ditch	Stuck creek	April 1, 1881	16.12	....	56.95	5
Jim Creek ditch	Jimmy creek	July 10, 1881	9	....	73.07	6
Bliler and Boswell ditch	Big Laramie river	April 1, 1882	16.43	....	82.07	7
Mansfield ditch	Big Laramie river	April 20, 1882	11.61	....	98.50	8
Yelton ditch	Big Laramie river	July 1, 1882	30.14	....	110.11	9
Martin ditch No. 1	Big Laramie river	April 20, 1883	15.50	....	140.25	10
La Garde ditch	La Garde creek	June 10, 1883	10.33	....	155.75	11
Ward ditch No. 1	Jimmy creek	June 15, 1883	4.25	....	166.08	12
Ward ditch No. 2	Jimmy creek	July 1, 1883	9.48	....	170.33	13
Jimmy Creek ditch	Jimmy creek	June 1, 1884	5.52	....	179.81	14
Smith's Brown ditch	Big Laramie river	June 10, 1884	16.53	....	185.33	15

Trollope Creek ditch	Trollope creek	June 15, 1884	6.89	----------	201.86	16
Homestead ditch	McIntyre creek	July 10, 1884	9	----------	208.75	17
Martin ditch No. 2	Big Laramie river	April 30, 1887	14.50	----------	217.75	18
Grace Creek ditch	Grace creek	April 1, 1888	3.07	----------	232.25	19
Brown ditch	Nun creek	May 31, 1890	10	----------	235.32	20
Lamb ditch	McIntyre creek	June 1, 1890	3.88	----------	245.32	21
Jimmy Creek ditch	Extension to Big Laramie river	May 1, 1891	No additional appropriation			22
Laramie River ditch	Big Laramie river	Aug. 7, 1891	400	----------	249.20	23
Comet ditch	McIntyre creek	Dec. 7, 1892	7.40	----------	649.20	24
Forrester ditch	Brown creek	May 15, 1893	7	----------	656.60	25
Pache ditch	La Garde creek	May 25, 1893	18.14	----------	663.60	26
Link ditch No. 1	Big Laramie river	June 1, 1894	14.22	----------	681.74	27
Lone Tree ditch	Lone Tree creek	Oct. 24, 1894	25	----------	695.96	28
French Woman ditch	French Woman creek	May 28, 1896	7.56	----------	720.96	29
Trollope Creek ditch, enlargement	Tollope creek	May 29, 1896	10.86	17.75	728.52	30
Slough Creek ditch	Slough creek	May 30, 1896	4.11	----------	739.38	31
Link ditch No. 2	Big Laramie river	June 15, 1896	2	----------	743.49	32
				Total	745.49	

TABLE

GIVING DITCH DECREES IN WATER DISTRICT NO. 64, PREPARED BY THE SUPERINTENDENT OF IRRIGATION OF WATER DIVISION NO. 1, FROM THE CERTIFIED COPY OF THE DECREES GOVERNING APPROPRIATIONS IN THIS DISTRICT, FURNISHED HIM BY THE CLERK OF THE DISTRICT COURT ISSUING SUCH DECREES.

NAME OF DITCH OR CANAL	Source of Appropriation	Date of appropriation	Amount in second feet decreed to each priority	Total amount in second feet decreed to each ditch or canal	Total amount in second feet previously decreed in district	Order of priority in district
South Platte Ditch Co.'s ditch	South Platte river	May 1, 1872	50			1
Sterling Irrigating Co.'s ditch	South Platte river	July 15, 1873	175		50	2
Pawnee ditch	South Platte river	Sept. 17, 1873	67		225	3
Schneider Ditch Co.'s ditch	South Platte river	July 15, 1875	37.50		292	4
Schneider Ditch Co.'s ditch, first enlargement	South Platte river	Oct. 20, 1880	75	112.50	329.50	5
Henderson and Smith ditch	South Platte river	Nov. 13, 1880	12.50		404.50	6
Pawnee ditch, first enlargement	South Platte river	June 22, 1882	150	217.	417	7
Low Line ditch	South Platte river	Oct. 14, 1882	37.90		567	8
Iliff and Platte Valley ditch	South Platte river	Oct. 1, 1883	150		604.90	9
Sterling No. 2 ditch	South Platte river	June 7, 1884	50		754.90	10
Springdale ditch	South Platte river	July 19, 1886	62.50		804.90	11
Red Lyon ditch	Spring creek	Feb. 2, 1891	3.50		867.40	13
Bravo ditch	South Platte river	Feb. 21, 1893	40		870.90	14
Powell and Dillon ditch	South Platte river	Dec. 12, 1893	45		910.90	15
Red Lyon ditch	Spring creek	Aug. 22, 1894	2	5.50	955.90	16

Harmony ditch	South Platte river	April 28, 1895	252		957.90	17
Lone Tree ditch	South Platte river	July 19, 1895	82		1,209.90	18
Ramsey ditch	South Platte river	Aug. 23, 1894	12		1,291.90	19
Huston ditch	South Platte river	Sept. 17, 1894	10		1,303.90	20
Davis Brothers ditch	South Platte river	Sept. 20, 1894	20		1,313.90	21
Knowles Spring ditch No. 1	Knowles Spring No. 1	Jan. 1, 1895	60		1,333.90	22
Powell ditch	South Platte river	Feb. 19, 1895	40		1,393.90	23
Harmony ditch No. 1	South Platte river	April 28, 1895			1,433.90	24
Chambers ditch	South Platte river	May 4, 1895	30		1,685.90	25
Lone Tree ditch	South Platte river	July 15, 1895	82		1,735.90	26
South Platte Extension ditch	South Platte river, etc	April 1, 1896	50		1,817.90	27
Harmony ditch No. 2	South Platte river	May 3, 1897	50		1,867.90	28
Knowles Spring ditch No. 2	Knowles spring, etc	April 22, 1898	60		1,917.90	29
				Total	1,977.90	

NOTE.—The Iliff and Platte Valley reservoir—source of supply the South Platte river, through the Iliff and Platte Valley ditch; date of appropriation, November 15, 1888; capacity, 12 458,643 cubic feet; decreed priority, No. 12 in the district,

CHAPTER VI.

SEEPAGE MEASUREMENTS AND DITCH RATINGS.

SEEPAGE MEASUREMENTS.

RETURN OR SEEPAGE WATERS OF THE SOUTH PLATTE RIVER.

Measurements of the seepage or return waters of the South Platte were continued during the fall of each year, 1899 and 1900, on practically the same line as had been pursued by this department for some years previous. The work each year was done entirely by a special deputy, who was assisted by the water commissioners of the various districts. Very favorable weather was had and the work was carried to the state line each year. In 1899 the work was done by M. D. Williams between October 23 and November 11; R. W. Hawley took the gaugings between October 19 and November 2, 1900. The total increase as found by Mr. Williams was 1119.74 second feet, being a considerable gain over any previous year. The total increase for 1900, as found by Mr. Hawley, was 800.19 second feet. We quote from Mr. Hawley's report: "These were carried on at a lower stage of river flow than that of any previous year, and at the close of a very dry season." This will, perhaps, partly account for the falling off from the previous year. An examination of the comparative table would indicate that while there is necessarily considerable fluctuation in this flow, it is yet on the increase, and is very encouraging as a factor in the future development of the Platte valley. The data obtained from these measurements is of great value as a basis upon which to figure future irrigation enterprises along the lower Platte valley.

It is believed that the investigations now being carried on by Professor Carpenter, of the State Agricultural college, on the Arkansas and other rivers, in which work this office should be able to co-operate, will in time be equally valuable. We have been able, with the use of the fee fund at our command, to co-operate in a small way with Professor Carpenter in the work of the Rio Grande and Uncompahgre rivers, the results of which are herewith appended. Professor Carpenter has also kindly furnished us with the results of his investigations on the tributaries of the South Platte and the Arkansas rivers. While these results will all be published in due time in the regular bulletins of the college, it is thought not out of place to print them here.

Professor Carpenter's letter and the tables following give the results of the measurements on the various streams.

THE COLORADO STATE AGRICULTURAL COLLEGE.
Barton O. Aylesworth, President.

THE AGRICULTURAL EXPERIMENT STATION.
L. G. Carpenter, Director and Irrigation Engineer.

Fort Collins, Colorado, December 12, 1900.

HON. A. J. McCUNE,
State Engineer, Denver, Colorado.

Dear Sir—The experiment station of the agricultural college has made systematic measurments of the seepage or return waters in this state for a number of years. The most extensive measurements have been made on the Cache la Poudre river, which have been made at least annually since 1892. Three measurements were made before then. Corresponding measurements have been made on the South Platte annually ever since 1889, a portion of the time by your office, and a part of the time by the experiment station, or by the experiment station in connection with your office. In addition to these the station has made measurements on the Arkansas river, from Canon City to the Kansas line; on the Rio Grande river, from the canon at Del Norte to the New Mexico line; on the various tributaries of the Platte river, and on the Uncompahgre. The other tributaries of the Platte besides the Poudre include the Big and Little Thompson, the St. Vrain and Left Hand creeks, Boulder and South Boulder creeks, Clear creek and Bear creek. These make an estimated linear distance, measured by the streams, of not less than seven hundred and fifty miles.

A report of the investigations up to 1896, together with a description of the conditions favoring seepage, was given in bulletin 33, published by the experiment station, copies of which may still be had upon application. The conclusions stated in that bulletin, which need but little modification, are as follows:

1. There is a real increase in the volume of the streams as they pass through the irrigated sections.

2. There is no such increase in the streams as they pass through the unirrigated sections. On the contrary, there is an actual loss, even when the drainage of a large area enters.

3. The increase is more as the irrigated area is greater.

4. The increase is approximately proportional to the irrigated area, and it seems probable that with more intimate knowledge of the amount of water applied and the features of the drainage, the proportions would be found to be close.

5. The amount of the increase depends very slightly, if at all, upon the rainfall; and, so far as it does, it is influenced principally by the rainfall on the irrigated lands. Only where the lands are already saturated is the rainfall sufficient to cause seepage.

6. There is no perceptible underflow from the side channels, even where they drain several thousand square miles.

7. The inflow is practically the same throughout the year. It is more in summer, less in winter, principally because of the effect of the temperature of the soil.

8. The passage of the seepage water through the soil is very slow, so that it may take years for the seepage from the outlying lands to reach the river.

9. The amount of seepage is slowly, but constantly, increasing.

10. It may be expected to increase for some years to come.

11. An increased amount of land may be brought under cultivation, with time, more especially on the lower portions of the streams.

12. The seepage being nearly constant throughout the year, while the needs are greatest in summer, the use of storage will best utilize the water from inflow.

13. ——————————.

14. ——————————.

15. On the Poudre river about 30 per cent. of the water applied in irrigation returned to the river.

16. The use of water on the upper portions of a stream, when water is not immediately needed by prior appropriators, will increase the flow of the stream late in summer, and pre-

vent such low stages as it would have without this regulating action.

17. The seepage water is already an important factor in the water supply for the agriculture of the state. The capital value of the water thus received in the valley of the Cache la Poudre alone is not less than $300,000, and perhaps $500,000, and for the Platte is from $2,000,000 to $3,000,000. It is large for the other streams, but of unknown amount.

18. An actual loss is incurred in carrying a stream like the Platte through sandy beds.

19. Ultimately the returns from seepage will make the lower portions of such valleys as the Platte more certain of water, and probably enable a larger acreage to be grown.

The measurements begun on the Platte river by the experiment station in 1894 were directed toward the determination of certain special objects, which had not before been considered. Among these was to determine whether there was a material increase in the stream from the sub-flow in the sandy tributaries.

With the experiments made the past year your office aided in bearing part of the expense incurred in making the measurements on the Rio Grande.

The full tables of measurements are here given and may be examined in detail by those interested. There are cases where the results do not seem to agree, or cases where the stream loses where it might be expected to gain, or gains where it might be expected to lose. In comparing the observations of different years there is a material discrimination in the different sections at the same time, and contradictions are sometimes found. The section which loses one year may gain the next. Sometimes this discrimination is due to some condition whose effect has not been eliminated, and there are cases where the contradiction is the real one.

Mr. R. E. Trimble has made the measurements in 1900 on the tributaries of the Platte and on the Uncompahgre, Mr. R. W. Hawley those on the Arkansas, and Messrs. Amos Jones and Antoine Jacob on the Rio Grande and the Conejos.

The method used has been essentially as follows: All the tributaries entering the stream and all the water taken out in ditches has been measured between two points on the river, where the volume was determined. In case of neither loss nor gain, the volume at the lower point should be equal to that at the upper, increased by the tributaries and decreased by the outgo. As a matter of fact, there is almost always a difference between the results thus found and the amount found by measurement; the lower measurement is generally found to be in excess, thus showing a gain in the stream from small or invisible sources. Sometimes there are tributaries which simply serve to collect the seepage from a greater or less area and bring it into the main stream in one channel. All such streams are measured and recorded, but if they are of such a character as to give reason to know that they consist almost entirely of seepage, the measurement is placed in parenthesis and not counted in the summation.

A fuller description of these measurements and of the measurements made since 1896 will be issued by the experiment station in a special bulletin in the near future.

Very respectfully yours,

L. G. CARPENTER.

SUMMARY OF GAINS.

Poudre—		
*August measurement	92.44	
September measurement	110.02	
Big Thompson—		
*July measurement	51.85	
September measurement	28.07	
Little Thompson	21.92	
Saint Vrain and Left Hand	43.46	
Boulder and South Boulder	28.65	
Clear Creek	15.80	
Bear Creek	15.71	
Total tributaries of the Platte in September and October		263.63
Rio Grande—August measurement	14.81	
Conejos	18.92	
Uncompahgre	88.56	

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*One section omitted.

SEEPAGE MEASUREMENTS ON ST. VRAIN CREEK, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
South of Lyons	October 17	------	39.04	66.24	------	------
Below Oligarchy ditch	October 17	9.37	31.65	21.44	−5.76	−5.76
Below Ni Wot ditch	October 18	16.99	1.77	2.01	2.85	−2.91
Near County line	October 18	------	------	31.95	14.72	11.81
Near County line	October 19	------	------	25.55	------	------
Near Mouth of Boulder creek	October 19	13.09	5.41	36.02	10.47	22.28
At Fleming bridge	October 19	------	------	49.28	5.58	27.86
Near mouth	October 19	------	------	57.83	8.55	36.41

SEEPAGE MEASUREMENTS ON LEFT HAND CREEK, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
Below Johnson ditch	October 20	----------	4.37	3.92	----------	----------
Below Holland ditch	October 20	----------	.41	.80	1.25	1.25
At Williamson ditch	October 20	----------	----------	----------	— .39	0.86
One mile west of Burch School	October 20	----------	----------	.18	.18	1.04
Near mouth	October 20	----------	----------	6.19	6.01	7.05

SEEPAGE MEASUREMENTS ON BIG THOMPSON RIVER, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
Below dam	July 21		157.16	104.76		
At Langston's	July 21	1.68	28.50	86.12	8.18	8.18
At Langston's	July 20			104.16		
Below L. & G. canal	July 20	35.67	46.23	99.87	6.27	14.45
Above Farmers' ditch	July 20	.06	19.55	76.84	—3.54	*10.91
Above Farmers' ditch	July 19			69.80		
At Lytle bridge	July 19		47.10	21.61	—1.09	*9.82
Below Hill and Brush ditch	July 19	2.24	5.51	26.32	7.98	17.80
At Ring place	July 19			30.58		
At Ring place	July 18			28.91		
Below Big Thompson and Platte River ditch	July 18		23.06	10.39	8.80	26.60
Near mouth	July 18	14.20	26.08	23.76	25.25	51.85

* Loss in section.

SEEPAGE MEASUREMENTS ON BIG THOMPSON RIVER, 1900

SECOND MEASUREMENT.

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
Below dam at Chasten's	September 18	-----------	49.45	30.28	-----------	-----------
At Langston's	September 18	.66	10.40	29.21	8.67	8.67
Below L. & G. dam	September 17	16.71	6.86	28.78	−10.28	−1.61
Below Farmers' ditch	September 17	-----------	3.35	34.45	9.02	7.41
At Lytle bridge	September 17	-----------	31.27	3.24	.06	7.47
At Lytle bridge	September 9	1.62	1.72	2.27	-----------	-----------
Below Hill & Brush ditch	September 9	-----------	-----------	5.18	3.01	10.48
Below Hill & Brush ditch	September 8	-----------	6.99	4.67	-----------	-----------
Below Big Thompson and Platte River ditch	September 8	4.26	12.64	2.77	5.09	15.57
Near mouth	September 8	-----------	-----------	5.89	11.50	27.07

SEEPAGE MEASUREMENTS ON UNCOMPAHGRE RIVER, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
At Bachelor switch	November 1	2.40	6.17	32.04	----	----
One-half mile below 11th corner line	November 1	3.21	1.44	29.37	1.10	1.10
Near Ridgway	November 1	----	----	54.42	23.28	24.38
Near Ridgway	November 2	35.58	2.42	57.64	----	----
Six and one-half miles below Ridgway	November 2	1.98	12.32	88.15	—2.65	21.73
At county line	November 2	----	----	88.91	11.10	32.83
At county line	November 3	.50	50	92.11	----	----
At Stark bridge near Montrose	November 3	----	40.63	52.94	10.33	43.16
Bridge at Montrose	November 4	----	17.37	12.22	—.09	43.07
Above Spring creek	November 4	7.43	23.17	14.28	19.43	62.50
Wagon bridge, Olathe	November 5	----	10.47	14.51	15.97	78.47
Below Boles and Mauny ditch	November 5	----	5.78	----	—4.04	74.43
One-half mile above mouth	November 5	----	----	8.45	14.23	88.66

SEEPAGE MEASUREMENTS ON CACHE LA POUDRE RIVER, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
At weir	Aug. 2	0.39	197.13	308.85		
Above new Mercer ditch	Aug. 2			117.19	5.08	5.08
Above new Mercer ditch	Aug. 3	53.20	105.80	138.02		
Below Larimer and Weld dam	Aug. 3			82.29	—3.13	1.95
Below Larimer and Weld dam	July 12	64.79	76.79	146.88		
Below No. 2 Reservoir Supply ditch	July 12			120.11	—14.77	—12.82
Below No. 2 Reservoir Supply ditch	July 13	159.97	2.53	112.93		
At Strauss bridge	July 13			221.62	—3.74	—16.56
At Strauss bridge	July 14		138	235.02		
Below No. 2 dam	July 14		34.38	80.18	—16.84	—33.40
Below Eaton ditch	July 14			51.43	5.63	—27.77
Below Eaton ditch	July 16	3	62.58	65.94		
Below Greeley No. 3 dam	July 16		6.27	12.66	6.30	—21.47
Mill Power canal	July 17	1.23	59.25	37.56	30.17	8.70
Below Camp ditch	July 17			13.83	34.29	42.99
One-quarter mile above mouth	July 17			57.22	43.39	86.38

SEEPAGE MEASUREMENTS ON RIO GRANDE RIVER, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
Railroad station at South Fork	Aug. 30	.85	33.41	194.24		
United States G. S. gaging station	Aug. 31			209.83	48.15	48.15
United States G. S. gaging station	Aug. 20		146.61	249.06		
Above Del Norte canal	Aug. 20			176.50	—25.95	22.20
Above Del Norte canal	Aug. 21		32.11	178.90		
At Off's	Aug. 21			168.48	21.69	43.89
At Off's	Aug. 22		47.19	156.22		
Below Prairie canal	Aug. 22	0.31		99.29	—10.05	33.84
Below Prairie canal	Aug. 23	4.33	96	108.91		
Below Monte Vista bridge	Aug. 23			14	—3.24	30.60
Below Monte Vista bridge	Aug. 24		30.29	14.30		
Below San Luis canal	Aug. 24	5.21	14.24	5.90	21.89	52.49
Below Hickory-Jackson ditch	Aug. 24			10.65	13.98	66.47
Below Hickory-Jackson ditch	Aug. 25		10.69	11.55		
Below Alamosa	Aug. 25			1	.14	66.61
Below Alamosa	Aug. 27			1.01		
Above mouth of Conejos river	Aug. 27	14.33		1.35	.24	66.85
Below Conejos, north branch	Aug. 27	6.90		15.33	— .35	66.50
Below Las Sauces	Aug. 27			23.98	1.75	68.25
Below Las Sauces	Aug. 28			22.31		
Above State bridge	Aug. 28			17.22	—5.09	63.16

SEEPAGE MEASUREMENTS ON CACHE LA POUDRE RIVER, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
At weir in canon	Sept. 4	----------	117.83	118.32	----------	----------
Below Collins water works dam	Sept. 4	25.22	34.24	4.87	4.38	4.38
Below Larimer and Weld dam	Sept. 5	----------	----------	----------	4.15	8.53
Below Larimer and Weld dam	Sept. 30	.52	13.24	15.02	----------	----------
Below No. 2 Reservoir Supply ditch	Sept. 30	----------	----------	5.74	3.56	12.09
Above head of Box Elder ditch	Sept. 30	----------	----------	11.09	5.35	17.44
Above head of Box Elder ditch	Sept. 31	----------	3.06	8.67	----------	----------
Strauss bridge	Sept. 31	----------	.97	11.75	6.14	23.58
Below No. 2 Canal dam	Sept. 31	----------	----------	12.15	1.37	24.95
Below No. 2 Canal dam	Sept. 5	----------	6.97	9.87	----------	----------
Below Eaton ditch	Sept. 5	----------	----------	5.93	3.03	27.98
Below Eaton ditch	Sept. 6	15.44	20.07	6.29	----------	----------
Below Greeley No. 3 dam	Sept. 6	----------	5.93	2.96	1.30	29.28
Below Greeley Power canal	Sept. 6	----------	----------	18.43	21.40	50.68
Below Greeley Power canal	Sept. 7	.18	33.64	18.75	----------	----------
Below Camp ditch	Sept. 7	----------	----------	9.78	24.49	75.17
Near mouth	Sept. 7	----------	----------	44.63	34.85	110.02

SEEPAGE MEASUREMENTS ON CONEJOS RIVER, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
At state gaging station	August 31			24.65		
Above San Juan bridge	August 31		1.97	24.77	2.09	
At bridge	August 31		2.15	.50	—22.12	—20.03
Above Cerritos	August 30	.77		.80	.30	—19.73
Below San Antonio creek	August 30		3.32	.55	—1.02	—20.75
At McIntire Place	August 30			3.88	6.65	—14.10
At McIntire place	August 29		24	4.33		
Below McIntire spring	August 29		14.19	31.33	3	—11.10
Two hundred feet above bridge	August 29			24.02	6.88	—4.22

SEEPAGE MEASUREMENTS ON CLEAR CREEK, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
Three-fourths mile above Golden	October 29	.49	20.94	27.39		
Below Rocky Mountain ditch	October 29			4.46	−2.48	−2.48
Below Rocky Mountain ditch	October 30		1.75	10.56		
Near where river branches	October 30		.93	16.83	8,02	5.54
Near junction of river	October 30			20.26	4.36	9.90
Near junction of river	November 17		17.39	13.87		
Below Clear Creek and Platte River ditch	November 17	.49		.23	3.75	13.65
At mouth	November 17			2.87	2.15	15.80

SEEPAGE MEASUREMENTS ON BEAR CREEK, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
Above Morrison dam	October 27	----------	----------	21.06	----------	----------
Below Morrison	October 27	.23	9.69	6.57	----------	----------
Below Pioneer Union ditch	October 27	----------	.23	.81	3.70	3.70
County line	October 27	.69	8.64	10.11	9.53	13.23
Near mouth	October 27	----------	----------	4.64	2.48	15.71

SEEPAGE MEASUREMENTS ON BOULDER CREEK, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
At Gaging station	October 24	----------	5.05	29.25	----------	----------
At Valmont bridge	October 24	----------	28.64	14.24	13.63	13.63
At Leggett's crossing	October 24	----------	----------	18.10	3.86	17.49
At Leggett's crossing	October 25	----------	11.98	9.97	----------	----------
Plumb crossing, county line	October 25	----------	----------	9.59	11.60	29.09
One-half mile above mouth	October 25	----------	7.06	1.04	—1.49	27.60

SEEPAGE MEASUREMENTS ON SOUTH BOULDER CREEK, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
At Gaging station	------------	------------	7.44	9.24	------------	------------
Below Dry Creek ditch	------------	------------	2.68	2.63	.93	.93
One-half mile above mouth	------------	------------	------------	.07	.12	1.05

SEEPAGE MEASUREMENTS ON LITTLE THOMPSON CREEK, 1900

PLACE OF MEASUREMENT	Date	Section		River	Section Gain or Loss	Total Gain or Loss
		Inflow	Outtake			
Below Eagle ditch	September 15	.02	------	.74	------	------
Below mouth of Dry creek	September 15	------	4.42	2.67	1.91	1.91
At Rockwell bridge	September 15	------	------	3.34	5.19	8.10
At Rockwell bridge	September 16	------	3.75	3.31	------	------
Below Minor and Langdon ditch	September 16	.53	------	3.45	3.89	11.99
At Graham bridge	September 16	------	9.08	11.10	7.65	19.54
Near mouth	September 16	------	------	5.30	3.28	22.82

TABLE OF MEASUREMENTS OF SEEPAGE WATER

IN SOUTH PLATTE RIVER, COLORADO, FROM OCTOBER 23 TO NOVEMBER 11, 1899.

Names of Streams and Ditches Where Measurements Were Taken	Amount of water in river	Amount of water diverted from river by canals	Amount of inflow from natural tributaries	Amount of water in river at points measured+that diverted and—the inflow	Increase in volume of river between points measured	Decrease in volume of river between points measured	Increase in volume of river from gaging station in canon to point where last measured	Remarks
South Platte river	154.49							At Canon, October 23
High Line canal		131.59						October 23
Denver Union Water Co		22						October 23
Platte Canon ditch		32.60						October 24
Wasteway Platte Canon ditch			7.5					October 24
Last Chance ditch		2.82						October 24
City ditch		18.83						October 24
South Platte river	27.08			227.42	72.93			October 24, below City ditch
Plum creek			1.45					October 24
Deer creek			1.78					October 24
Nevada ditch		21.73						October 24
South Platte river	60.08			88.04	60.96		133.89	October 24, at Littleton
South Platte river	55.29							October 26, at Littleton
Bear creek			13.41					October 26

TABLE OF MEASUREMENTS OF SEEPAGE WATER

IN SOUTH PLATTE RIVER, COLORADO, FROM OCTOBER 23 TO NOVEMBER 11, 1899.—(Continued.)

Names of Streams and Ditches Where Measurements Were Taken	Amount of water in river	Amount of water diverted from river by canals	Amount of inflow from natural tributaries	Amount of water in river at points measured+that diverted and—the inflow	Increase in volume of river between points measured	Decrease in volume of river between points measured	Increase in volume of river from gaging station in canon to point where last measured	Remarks
Ditch		.19						October 26
Seepage stream			(3.86)					October 26
Clark gulch			(10.87)					October 26
South Platte river	84.91			71.69	16.40		150.29	October 26, at 15th street bridge
South Platte river	88.90							October 27, at 15th street bridge
Farmers and Gardeners' ditch		4.47						October 27
Burlington ditch		89.30						October 27
Clear creek			.18					October 27
Fulton ditch		38.87						October 27
South Platte river	54.67			135.51	46.61		196.90	October 27; city waste included in this quantity.
Brantner ditch		45.75						October 28, below head of Fulton
Brighton ditch		5.02						October 28
South Platte river	81.38			132.15	77.48		274.38	October 28, west of Brighton at bridge
Dry creek			(23.81)					October 28

Platteville ditch		4.60						October 28
South Platte river	126.73			131.33	49.95		324.33	October 28, below head Platteville ditch
Evans No. 2 ditch		14.94						October 30
Side Hill and Meadow Island No. 2		1.60						October 30
Bucker		7.20						October 30
South Platte river	140.75			155.49	38.76		363.09	October 30, at Platteville bridge
Cook and Hewes		12.39						October 30
St. Vrain river			94.91					October 30
South Platte river	270.87			188.35	47.65		410.74	October 31, below Union ditch
Big Thompson creek			39.49					October 31
Section No. 3 ditch		12.60						October 31
Lower Latham ditch		26.73						October 31
South Platte river	334.88			334.72	63.85		474.59	October 31, at Evans bridge
Cache la Poudre river			151.01					November 1
Lone Tree creek			5.49					November 1
Sterling seepage		5.59						November 1
South Platte river	575.27			424.36	89.48		564.07	November 1, below Hoover
Box Elder creek			6.79					November 2
Harden ditch		5.62						November 2
Latham waste			5.42					November 2
Corona ditch		4.57						November 2
South Platte river	638.19			636.17	60.90		624.97	November 2, head of Putnam ditch
Putnam ditch		8.61						November 2
Weldon Valley ditch		18.85						November 3
South Platte river	613.98			641.44	3.25		628.22	November 3, at Orchard bridge

TABLE OF MEASUREMENTS OF SEEPAGE WATER

IN SOUTH PLATTE RIVER, COLORADO, FROM OCTOBER 23 TO NOVEMBER 11, 1899.—(Concluded.)

Names of Streams and Ditches Where Measurements Were Taken	Amount of water in river	Amount of water diverted from river by canals	Amount of inflow from natural tributaries	Amount of water in river at points measured+that diverted and—the inflow	Increase in volume of river between points measured	Decrease in volume of river between points measured	Increase in volume of river from gaging station in canon to point where last measured	Remarks
South Platte river	701.33			701.33	87.35		715.57	November 4, at Shaffer's ford
Bijou creek			4					November 4
Dueul and Snyder ditch		9.69						November 4
South Platte river	702.78			712.47	7.14		722.71	November 4, Fort Morgan bridge
Piatt ditch		13.41						November 4
Platte and Beaver ditch		5						November 5
A. A. Smith ditch		15.74						November 5
South Platte river	741.26			775.41	72.63		795.34	November 5, Snyder bridge
Johnson & Edwards ditch		29.75						November 6
Tetsel ditch		9.67						November 6
South Platte ditch		27.58						November 7
Davis Bros. ditch		28.63						November 7
Pawnee ditch		96.78						November 7
South Platte river	552.72			835.13	93.87		889.21	November 7, Merino bridge

Sterling No. 1 ditch		21.98						November 7
Sterling No. 2 ditch		13.72						November 7
Smith & Henderson ditch		11.59						November 8
South Platte river	581.16			628.45	75.73		962.94	November 8, Sterling bridge
Low Line ditch		54.82						November 9
Iliff ditch		5.14						November 9
South Platte river	567.39			627.35	46.19		1,009.13	November 9, Iliff bridge
Harmony No. 1 ditch		38.79						November 9
Harmony No. 2 ditch		15.02						November 9
South Platte river	582.96			636.77	69.38		1,078.51	November 9, Crook
Peterson ditch		110.28						November 11
South Platte river	445.55			555.83		17.13		Above Pole creek
South Platte river	486.78			486.78	41.23		1,119.74	November 12, State line

NOTE—Quantities in parenthesis are seepage, and are not included in natural flow.

Respectfully,

(Signed) M. D. WILLIAMS,
Hydrographer.

TABLE OF MEASUREMENTS OF SEEPAGE WATER

IN SOUTH PLATTE RIVER, COLORADO, FROM OCTOBER 19 TO NOVEMBER 2, 1900.

NAMES OF STREAMS	Amount in river	Amount removed from river	Amount entering river	Amount in river at points measured + outtake in canals, etc., and − the inflow	Increase between points of measurement	Decrease	Entire increase from canon gaging station	Increase in volume per mile	Date	Remarks
High Line canal		73.30							Oct. 19	
South Platte river	97.85									Below High Line waste
Platte Canon ditch		55.30								
Last Chance ditch		14.70								
City ditch		30								
South Platte river	31.81			131.81	33.96		33.96	6—5.66	Oct. 19	Below City ditch
Plum creek			3.07						Oct. 20	
Deer creek			23.54						Oct. 20	
Nevada ditch		13.48							Oct. 20	
Lee gulch			.75						Oct. 20	Seepage gaged for record only.
Clark gulch			.503						Oct. 20	
Dutch gulch			1.11						Oct. 20	
Nevada ditch waste			3.167						Oct. 20	
South Platte river	89.394			71.98	40.17		74.13	6-6.69	Oct. 20	Lower Littleton bridge

Big Dry creek	--------	--------	.96	--------	--------	--------	--------	--------	Oct.	20	Seepage
Little Dry creek	--------	--------	12.43	--------	--------	--------	--------	--------	Oct.	20	
Bear creek	--------	--------	10.83	--------	--------	--------	--------	--------	Oct.	20	
Union Water Co	--------	15.47	--------	--------	--------	--------	--------	--------	Oct.	20	
South Platte river	113.40	--------	--------	105.61	16.22	--------	90.35	10—1.62	Oct.	20	Fifteenth street, Denver
South Platte river	161.26	--------	--------	--------	--------	--------	--------	--------	Oct.	22	Fifteenth street, Denver
Farmers' and Gardeners' ditch	--------	5.10	--------	--------	--------	--------	--------	--------	Oct.	22	
City sewer	--------	--------	61.42	--------	--------	--------	--------	--------	Oct.	22	
Burlington ditch	--------	121.72	--------	--------	--------	--------	--------	--------	Oct.	22	
F. and G. ditch, waste	--------	--------	3.73	--------	--------	--------	--------	--------	Oct.	22	
Heller ditch	--------	2.11	--------	--------	--------	--------	--------	--------	Oct.	22	
Clear creek	--------	--------	1.40	--------	--------	--------	--------	--------	Oct.	22	
South Platte river	95.50	--------	--------	157.87	--------	3.39	86.96	Dec. 11—.31	Oct.	22	Approach to Fulton ditch
South Platte river	76.82	--------	--------	--------	--------	--------	--------	--------	Oct.	23	Approach to Fulton ditch
Fulton ditch	--------	51.73	--------	--------	--------	--------	--------	--------	Oct.	23	
Seepage stream	--------	--------	.68	--------	--------	--------	--------	--------	Oct.	23	Flows into Fulton ditch
Brighton ditch	--------	16.92	--------	--------	--------	--------	--------	--------	Oct.	23	
South Platte river	81.83	68.65	--------	150.48	73.66	--------	160.62	7—10.52	Oct.	23	Brighton bridge
Dry creek	--------	--------	15.17	--------	--------	--------	--------	--------	Oct.	23	
Platteville ditch	--------	18.80	--------	--------	--------	--------	--------	--------	Oct.	23	
McCann Seepage ditch	--------	--------	4	--------	--------	--------	--------	--------	Oct.	23	Now enters river
South Platte river	112.06	18.80	15.17	115.69	33.80	--------	194.48	8—4.23	Oct.	23	Platteville dam
Evans No. 2 ditch	--------	48.38	--------	--------	--------	--------	--------	--------	Oct.	23	
Beaman and Meadow Island ditches	--------	17.72	--------	--------	--------	--------	--------	--------	Oct.	24	One rating flume
Independent ditch	--------	23.70	--------	--------	--------	--------	--------	--------	Oct.	24	

TABLE OF MEASUREMENTS OF SEEPAGE WATER

IN SOUTH PLATTE RIVER, COLORADO, FROM OCTOBER 19 TO NOVEMBER 2, 1900.—(Continued.)

NAMES OF STREAMS	Amount in river	Amount removed from river	Amount entering river	Amount in river at points measured + outtake in canals, etc., and — the inflow	Increase between points of measurement	Decrease	Entire increase from canon gaging station	Increase in volume per mile	Date	Remarks
South Platte river	44.48	89.80	--------	134.28	22.22	--------	216.70	8—2.78	Oct. 24	Platteville
Cook & Hewes ditch	--------	16.17	--------	--------	--------	--------	--------	--------	Oct. 24	--------
Seepage to C. & H. ditch	--------	2	--------	--------	--------	--------	--------	--------	Oct. 24	--------
St. Vrain river	--------	52.57	--------	--------	--------	--------	--------	--------	Oct. 24	--------
South Platte river	121.94	16.17	52.57	85.54	41.06	--------	257.76	9—4.56	Oct. 24	Below Union ditch
Section No. 3 ditch	--------	2.62	--------	--------	--------	--------	--------	--------	Oct. 24	--------
Big Thompson river	--------	--------	16.78	--------	--------	--------	--------	--------	Oct. 24	--------
Lower Latham seepage ditch	--------	--------	20.07	--------	--------	--------	--------	--------	Oct. 24	Now enters river
Lower Latham ditch	--------	19.56	--------	--------	--------	--------	--------	--------	Oct. 24	--------
South Platte river	192.58	22.18	16.78	197.98	76.04	--------	333.80	7½-10 14	Oct. 24	Evans bridge
Poudre river	--------	--------	84.69	--------	--------	--------	--------	--------	Oct. 25	--------
Lone Tree creek	--------	--------	1.87	--------	--------	--------	--------	--------	Oct. 25	--------
Sterling seepage ditch	4.65	--------	--------	--------	--------	--------	--------	--------	Oct. 25	--------
South Platte river	298.77	--------	86.56	212.21	19.63	--------	353.43	6—3.27	Oct. 25	Kersey bridge

Box Elder creek			6.78						Oct.	25	
South Platte river	361.20		6.78	354.42	55.65		409.08	8—6.96	Oct.	26	Hardin station
Latham waste			.54						Oct.	26	
Corona ditch		4.13							Oct.	26	
Schultz ditch		11.58							Oct.	26	
South Platte river	349.89	15.71	.54	65.06	3.86		412.94	12—.32	Oct.	26	Above Putnam ditch
Putnam ditch		7.50							Oct.	26	
Weldon Valley ditch		45.20							Oct.	26	
South Platte river	323.78	52.71		376.49	23.60		439.54	8½—3.13	Oct.	27	Orchard Station
Fort Morgan canal	238.01								Oct.	27	
South Platte river	115.24			353.25	29.47		469.01	9—3.27	Oct.	27	
Deuel & Snyder ditch		5.64							Oct.	27	
Upper Platte and Beaver ditch		116.72							Oct.	27	
Piatt ditch		22.55							Oct.	27	
South Platte river	14.05	144.91		158.96	43.72		512.73	9—4.86	Oct.	27	Below Fort Morgan bridge
Lower Platte and Beaver ditch		46.15							Oct.	29	
A. Smith ditch		25.19							Oct.	29	
South Platte river	26.48	71.34		97.82	83.77		596.50	11—7.62	Oct.	29	Snyder
Johnson & Edwards ditch		23.26							Oct.	29	
Tetsel ditch		19.52							Oct.	29	
South Platte ditch		23.57							Oct.	30	All water taken by this ditch
Pawnee ditch		24.50							Oct.	30	
Davis Bros. ditch		2.78							Oct.	30	
South Platte river	18.39	93.63		112.02	85.51		682.04	18—4.75	Oct.	30	Merino bridge
Snyder ditch		7.26							Oct.	30	

TABLE OF MEASUREMENTS OF SEEPAGE WATER

IN SOUTH PLATTE RIVER, COLORADO, FROM OCTOBER 19 TO NOVEMBER 2, 1900.—(Concluded.)

NAMES OF STREAMS	Amount in river	Amount removed from river	Amount entering river	Amount in river at points measured + outtake in canals, etc., and — the inflow	Increase between points of measurement	Decrease	Entire increase from cañon gaging station	Increase in volume per mile	Date	Remarks
Springdale ditch		31.86							Oct. 30	
Sterling No. 1 ditch		11.40							Oct. 30	
South Platte river	29.90	50.52		80.42	62.03		744.07	13¾–4.51	Oct. 31	Sterling bridge
Bravo ditch		28.50							Oct. 31	
Cedar creek			.50						Oct. 31	
South Platte river	27.71	28.50	.50	55.71	5.19		749.26	11¾–.44	Oct. 31	Iliff bridge
South Platte river	51.35				23.64		772.90	17—1.39	Nov. 1	Crook bridge
South Platte river	50.66					.69	772.21	15—.04	Nov. 1	Sedgwick bridge
South Reservation ditch		2.47							Nov. 2	State line
Lodge Pole creek			.18						Nov.	
South Platte river	76.35	2.47	.18	78.64	27.98		800.19	17—1.65	Nov. 2	State line

These gagings were carried on at a lower stage of river flow than in any previous year, and at the close of an extremely dry fall. During the work there was no precipitation and no fluctuation in the river flow, except between Denver and Platteville, where the total gain is correct, but may be properly thrown into other sections than are assigned.

Respectfully,

(Signed) R. W. HAWLEY.

DITCH RATINGS.

During the season of 1899 no effort was made to have ditch ratings made, and in consequence ratings were made only upon ditches whose owners demanded the same and guaranteed the expenses. In the spring of 1900, a small fund having accumulated from the collection of fees, the commissioners of districts where it was thought ratings were most needed were asked to secure subscriptions guaranteeing a certain sum for expenses. This plan worked satisfactorily in several districts, and a greater number of ditches were rated than in any season for a number of years. From notes taken by our gaugers we infer that many of the rating flumes are in poor condition, and consequently the ratings of such will not stand any length of time, and may perhaps be only an approximation.

This subject is discussed somewhat under another head. A list of ditches rated is appended herewith. Rating tables were furnished the commissioners and the superintendents of ditches when demanded.

DITCHES RATED IN 1899

WATER DIVISION NO. 1 (SOUTH PLATTE DIVISION).

NAME OF DITCH	No. of District	Hydrographer	Date of Rating
Fulton	2	M. C. Hinderlider	June 8
Town or Arthur	3	L. G. Carpenter	June 15
Erie	6	M. C. Hinderlider	June 19
Golden City and Ralston creek	7	H. C. Hall	Aug. 1
Rocky Mountain	7	H. C. Hall	Aug. 2
Agricultural	7	H. C. Hall	Aug. 2
Farmers' High Line	7	M. C. Hinderlider	Aug. 28

WATER DIVISION NO. 2 (ARKANSAS DIVISION).

NAME OF DITCH	No. of District	Hydrographer	Date of Rating
Rocky Ford High Line	14	M. C. Hinderlider	July 12
Colorado and Kansas	67	M. C. Hinderlider	May 30

DITCHES RATED IN 1900

WATER DIVISION NO. 1 (SOUTH PLATTE DIVISION).

NAME OF DITCH	No. of District	Hydrographer	Date of Rating
Fulton	2	R. F. Walter	July 30
Brantner	2	R. F. Walter	July 30
Beaman	2	R. F. Walter	July 30
Farmers' Independent	2	R. F. Walter	July 31
Platteville	2	R. F. Walter	July 31
Brighton	2	R. F. Walter	July 31
Cook and Hewes or Western	2	R. F. Walter	Aug. 1
Union	2	R. F. Walter	Aug. 1
Section No. 3	2	R. F. Walter	Aug. 1
North Poudre	3	R. F. Walter	June 21
Larimer county	3	R. F. Walter	June 22
Dry Creek or Jackson	3	R. F. Walter	June 22
Mill Power	3	R. F. Walter	June 27
Larimer and Weld	3	R. F. Walter	June 28
Larimer No. 2	3	R. F. Walter	June 28
Colony No. 3	3	R. F. Walter	July 5
Cache La Poudre, or No. 2	3	R. F. Walter	July 6
Outlet B. H. Eaton reservoir	3	R. F. Walter	July 6
Larimer County	3	R. F. Walter	Aug. 17
Outlet North Poudre	3	R. F. Walter	Aug. 25
Larimer County	3	R. F. Walter	July 20
St. Vrain reservoir outlet	5	R. F. Walter	June 19
Supply	5	R. F. Walter	July 9
Highland	5	R. F. Walter	July 9
Goodhue	6	R. F. Walter	July 2
Marshallville	6	R. F. Walter	July 2
Dry Creek No. 2	6	R. F. Walter	July 2
South Boulder and Bear Creek	6	R. F. Walter	July 2
South Boulder and Coal Creek	6	R. F. Walter	July 3
Velie and Shanahan	6	R. F. Walter	July 3
Davidson	6	R. F. Walter	July 3
Boulder and Left Hand	6	R. F. Walter	July 10
North Boulder Farmers'	6	R. F. Walter	July 10
Boulder and White Rock	6	R. F. Walter	July 10
Farmers'	6	R. F. Walter	July 11
Anderson	6	R. F. Walter	July 11
Butte Mill	6	R. F. Walter	July 11

DITCHES RATED IN 1900—Continued.

WATER DIVISION NO. 1 (SOUTH PLATTE DIVISION)—Concluded.

NAME OF DITCH	No of District	Hydrographer	Date of Rating
M. G. Smith	6	R. F. Walter	July 11
McGinn	6	R. F. Walter	July 12
South Boulder Canon	6	R. F. Walter	July 12
Enterprise	6	R. F. Walter	July 12
City	8	R. F. Walter	July 23
High Line	8	R. F. Walter	July 24
Platte Canon	8	R. F. Walter	July 24
Nevada	8	R. F. Walter	July 24
Last Chance	8	R. F. Walter	July 25
City	8	L. R. Hope	Aug. 4
Low Line	64	R. F. Walter	Aug. 10
Patterson Lateral	64	R. F. Walter	Aug. 10
Schneider	64	R. F. Walter	Aug. 10
South Platte	64	R. F. Walter	Aug. 10
Davis Brothers	64	R. F. Walter	Aug. 11

WATER DIVISION NO. 2 (ARKANSAS DIVISION).

NAME OF DITCH	No. of District	Hydrographer	Date of Rating
Stubbs & Miller	10	M. C. Hinderlider	July 1
Twin Lakes reservoir, station No. 2	11	A. L. Fellows	July 10
Colorado canal	14	A. L. Fellows	July 11
Bessemer	14	A. L. Fellows	July 17
Rocky Ford High Line canal	14	L. R. Hope	July 15
Fort Lyon canal	17	L. R. Hope	July 12
Rocky Ford	17	L. R. Hope	July 13
Las Animas	17	L. R. Hope	July 16
Colorado and Kansas	67	C. W. Beach	July 5

DITCHES RATED IN 1900—Concluded.

WATER DIVISION NO. 3 (RIO GRANDE DIVISION).

NAME OF DITCH	No. of District	Hydrographer	Date of Rating
Rio Grande	20	M. C. Hinderlider	May 23
Farmers' Union	20	M. C. Hinderlider	May 24
Prairie	20	M. C. Hinderlider	May 25
Silva	20	M. C. Hinderlider	May 26
Monte Vista	20	M. C. Hinderlider	May 26
Rio Grande, Piedra Valley	20	M. C. Hinderlider	May 27
Rio Grande Lariat	20	M. C. Hinderlider	May 27
Star and Star Enlargement	20	M. C. Hinderlider	May 27
Empire	20	M. C. Hinderlider	May 28
Centennial	20	M. C. Hinderlider	May 28
Excelsior	20	M. C. Hinderlider	May 29
San Luis	20	M. C. Hinderlider	May 29
Costilla	20	M. C. Hinderlider	May 29
Hickory Jackson	20	M. C. Hinderlider	May 30
West Side	20	M. C. Hinderlider	May 30
Rio Grande	20	M. C. Hinderlider	May 30
Rio Grande canal	20	A. L. Fellows	July 11

WATER DIVISION NO. 5 (GRAND RIVER DIVISION).

NAME OF DITCH	No. of District	Hydrographer	Date of Rating
Uncompahgre, or Montrose and Delta	41	A. J. McCune	June 15
Loutzenberger	41	A. J. McCune	June 16
Eagle	41	A. J. McCune	June 16
Mt. Lincoln	42	M. C. Henderlider	June 8

CHAPTER VII.

STREAM GAUGINGS.

HON. A. J. McCUNE,
State Engineer, Denver, Colorado.

Dear Sir—In accordance with your request I have the honor to submit herewith a report of all stream gaugings made in Colorado by the United States geological survey, and by other parties so far as they have been sent to me for record during 1899 and 1900.

During these two years I have, under the direction of Mr. F. H. Newell, chief hydrographer of the survey, been engaged in carrying on a system of stream gauging following more or less closely the course pursued during previous years. In the pursuit of this work, through your courtesy, the State Engineer's office of Colorado has co-operated with me to the extent of its ability, and I seize this opportunity for thanking you for this assistance on your part. We are, moreover, under special obligations to several of the railroad companies whose lines run through the state, the officials of some of which, viz.: The Denver & Rio Grande, Union Pacific, Colorado & Southern, Atchison, Topeka & Santa Fe, the Burlington & Missouri River and the Rio Grande Southern, have furnished us with transportation, without which it would have been impossible for so much work to be done as has been accomplished. We believe that the courtesies thus extended have been compensated by information and statistics concerning the flow of our streams and the advantages that have accrued, and we hope still will accrue to the community at large through an increased knowledge of the water supply in different localities available for irrigation or for power.

We have also, as in the past, endeavored to co-operate to the greatest possible extent with all ditch companies, superintendents of irrigation divisions, water commissioners, and others who have been interested in learning facts concerning the flow of water in the streams in their immediate localities. Much information and assistance has been derived from a number of gentlemen connected with such companies and holding the offices specified, among whom I wish to mention as having furnished especial assistance, the officers of the Great Plains Water Company, the Amity Canal Company, the Buffalo Creek Canal Company, the Denver Union Water Company, and others; and to Messrs. Wolaver, Dickson, Kneale, Southland, Matlock, Burrows, Cressy and Obert, water commissioners of various districts in different parts of the state, and to many others who have furnished valuable assistance in various ways. Thanks are also due to all gauge observers throughout the state for their unfailing courtesy and untiring assistance for a compensation which is, to say the most, merely nominal.

We have aimed, so far as it was possible, or so far as the information seemed to be appreciated, to furnish statistics, concerning the flow of streams, to irrigation superintendents and water commissioners, and to newspapers published in different localities in the state. This work has been generally well received, and we believe that it should be considerably extended in the future. It is our aim to co-operate as fully as possible with all who are interested in irrigation and in the extension of our irrigated territory.

It has been our effort to obtain statistics, so far as funds would permit, over the entire state. Many of the stations maintained have been the same as those established and kept up during preceding years, but several changes have been made, old stations being abandoned and new ones taken up. At those stations which have been abandoned it is believed that enough statistics have been obtained for our present purposes, viz.: That of furnishing an approximate idea of the normal discharge of these streams, and others have been established and maintained in other places, with the view of eventually covering all of the most important streams of the state, and it is further hoped that statistics may be eventually obtained upon such streams as may prove effective for power purposes. Forty-one stations have been maintained for either the whole of the past two years, or for parts thereof, which will be described separately under the heads of the irrigation divisions in which they are situated. In the following report each division will be described in its numerical order, these divisions being:

Division No. 1, or the South Platte division.

Division No. 2, or the Arkansas division.

Division No. 3, or the Rio Grande division.

Division No. 4, or the San Juan division.

Division No. 5, or the Grand division.

Division No. 6, or the Green division.

A brief description will also be given of the work done at each of the gauging stations, which will be considered in their order down stream in each division, beginning with the one farthest up on the main stream first, then passing to the tributaries in their order down stream also. It is thought best that these should be thus briefly described and a general review given of the work done in each case, as several of the stations will be abandoned during the coming year and others taken up in their places. In making out the tables of discharge, only the mean, maximum and minimum stages have been given for each month. This office, however, is in possession of the discharge for each day at most of these places, and detailed information can be given at any time to such as may desire it. The statistics are filed for the entire period of time during which gaugings have been made, up to and including December, 1900, so that comparison of the flow in the several streams may be made for the different years covered. These are, as a rule, simply selected points at such locations upon the several streams as have been found to be best adapted for securing information concerning the normal flow, at such places as are considered of the most importance from the standpoint of distribution to irrigation ditches. Nowhere have permanent stations been made, although this is most desirable and we believe it would pay the state to take hold of this matter. To this I will refer later. The meters used have been the Price meters furnished by the United States geological survey. These are eminently satisfactory, giving, as they do, excellent results. They are not easily thrown out of adjustment, and the results obtained by their use may be relied upon as accurate.

The following two tables give the different stations at which series of gaugings and gauge readings have been taken, the first being arranged according to location from the head of the stream down in the several irrigation divisions, and the second being an alphabetical list of all such stations without reference to location.

SOUTH PLATTE RIVER DIVISION.

Cheesman lake, on Goose creek.

Cheesman lake, on South Platte river.

Platte canon, on South Platte river.
Denver, on South Platte river.
Orchard, on South Platte river.
Morrison, on Bear creek.
Forkscreek, on Clear creek.
Marshall, on South Boulder creek.
Boulder, on Boulder creek.
Lyons, on St. Vrain creek.
Arkins, on Big Thompson creek.
Fort Collins, on Cache a la Poudre creek.

ARKANSAS RIVER DIVISION.

Twin lakes, on Lake creek.
Granite, on Arkansas river.
Salida, on Arkansas river.
Canon City, on Arkansas river.
Pueblo, on Arkansas river.
Nepesta, on Arkansas river.
Rocky Ford, on Arkansas river.
Fort Lyons canal, on Arkansas river.
Colorado & Kansas canal, on Arkansas river.
Amity canal, on Arkansas river.
Lamar, on Arkansas river.
Buffalo Creek canal, on Arkansas river.
Trinidad, on Purgatoire river.
"J. J." ranch, on Purgatoire river.

RIO GRANDE DIVISION.

Del Norte, on Rio Grande.
Colorado state line, on Rio Grande.
Los Mogotes, on Conejos river.

SAN JUAN RIVER DIVISION.

Arboles, on San Juan river.
Arboles, on Piedra river.
Ignacio, on Los Pinos river.
Durango, on Florida river.
Durango, on Animas river.
Mancos, on Mancos river.

GRAND RIVER DIVISION.

Glenwood Springs, on Grand river.
Grand Junction, on Grand river.
Iola, on Gunnison river.
Grand Junction, on Gunnison river.
Fort Crawford, on Uncompahgre river.
Montrose, on Uncompahgre river.
Dolores, on Dolores river.
Fall Creek, on San Miguel river.

GREEN RIVER DIVISION.

No permanent stations have been maintained in this division, but a number of special measurements were made which will be given in their regular order.

LOCATION OF GAUGING STATIONS.

Animas river, at Durango.
Arkansas river, at Amity canal.
Arkansas river, at Buffalo Creek canal.
Arkansas river, at Canon City.
Arkansas river, at Colorado and Kansas canal.
Arkansas river, at Fort Lyons canal.
Arkansas river, at Granite.
Arkansas river, at Lamar.
Arkansas river, at Nepesta.
Arkansas river, at Pueblo.
Arkansas river, at Rocky Ford.
Arkansas river, at Salida.
Bear creek, at Morrison.
Big Thompson creek, at Arkins.
Boulder creek, at Boulder.
Cache a la Poudre, at Fort Collins.
Clear creek, at Forkscreek.
Conejos river, at Los Mogotes.
Dolores river, at Dolores.
Florida river, at Durango.
Goose creek, at Cheesman lake.
Grand river, at Glenwood Springs.

Grand river, at Grand Junction.
Gunnison river, at Grand Junction.
Gunnison river, at Iola.
Lake creek, at Twin lakes.
Los Pinos river, at Ignacio.
Mancos river, at Mancos.
Piedra river, at Arboles.
Purgatoire river, at "J. J." ranch.
Purgatoire river, at Trinidad.
Rio Grande river, at Colorado state line.
Rio Grande river, at Del Norte.
San Juan river, at Arboles.
San Miguel river, at Fall creek.
South Boulder creek, at Marshall.
South Platte river, at Cheesman lake.
South Platte river, at Denver.
South Platte river, at Orchard.
South Platte river, at Platte canon.
St. Vrain creek, at Lyons.
Uncompahgre river, at Fort Crawford.
Uncompahgre river, at Montrose.

SOUTH PLATTE IRRIGATION DIVISION.

Irrigation division No. 1, or the South Platte irrigation division, consists of the drainage basin of the South Platte river and its tributaries in Colorado. The South Platte river takes its rise in what is known as "South Park," near the center of the state, starting at points in the mountains of the Park range varying in altitude from 14,000 to 9,000 feet. From the points where it issues from the mountains at Platte canon it flows in a northerly direction through Denver to its junction with the Cache a la Poudre near Greeley. Thence it flows northeasterly, leaving the state a short distance northeast of Julesburg. The tributaries may be divided into two classes: Those which, like the headwaters of the South Platte itself, rise in the mountains, and those which drain the plains east of the mountains. The principal streams of the first class in their order down the river are, Bear creek, Clear creek, St. Vrain (into which flow Boulder and South Boulder creeks), Big Thompson creek and Cache a la Poudre. In the second class may be named as especially worthy of consideration Cherry creek, Lone Tree creek, Box Elder creek, Bijou creek, Beaver creek and Pawnee creek. There are also a great number of others of lesser note. The first class are those flowing from the mountains. They resemble the upper branches of the South Platte itself, in furnishing a perennial supply of water, varying, however, with the season, the discharges being great during the flood stage and low during the latter part of the summer and in the fall and winter. The plains streams, on the other hand, are torrential in their nature, furnishing water usually only in time of storms, or during the melting of snows. In general it may be said that the normal perennial discharge of all the streams of this division is claimed and used for irrigation, but great quantities of water go to waste at the flood stages and in time of storm. As there is practically an unlimited amount of land upon the plains adjacent to the South Platte that might be irrigated if there was a sufficient supply of water, the question of storage becomes one of great importance. The geological survey is now studying this question and examining such reservoir sites as are considered capable of storing considerable quantities of water. It is hoped that such reservoirs may be constructed as will eventually prevent this great loss of water which, if properly stored, would become one of the greatest assets of the state.

An interesting feature connected with the South Platte basin is the fact that in all its valleys there is so great a return from seepage. This increase in the normal supply of the water is growing from year to year as may be seen by your tables of the seepage measurements of this river. A study is also being made at the present time of the underground water supply of the plains in this basin, the results of which will be of great interest in showing the possibilities of procuring water from artesian sources for stock purposes and possibly for the irrigation of small tracts. Along the torrential streams of the plains the surface flow may be made available for irrigation purposes by the construction of suitable reservoirs, a few of which are now being constructed by corporations and private parties.

The most notable projects in this basin which have been under way during the year, are the Cheesman lake in South Park, a reservoir which is being constructed by the Denver Union Water Company and the Bijou Irrigation Company's reservoirs in the neighborhood of Orchard. The Cheesman lake reservoir is especially noteworthy on account of the height of its dam and the amount of water to be stored. The dam is expected to reach the enormous height of 210 feet, being constructed of solid masonry. The reservoir sites of the Bijou Irrigation Company consist of natural basins along the rims of which embankments will be constructed, thus storing large bodies of water. Any great extension of the irrigated area of this division must depend upon the construction of such reservoirs as those now being built and upon improving the use and distribution of water.

The present distributing system throughout this region, as in nearly all of Colorado, is very extravagant, in many cases there being several times as many ditch lines as are needed for the most economical use. In many cases also much water goes to waste in marshes and swamps which might be drained and an increased supply be made thus available.

CHEESMAN LAKE STATIONS ON GOOSE CREEK AND SOUTH PLATTE RIVER.

These stations were maintained for a portion of the year 1899 through the courtesy of Mr. Charles P. Allen, chief engineer of the Denver Union Water Company, the object being to ascertain the flow of water available for storage in Cheesman lake, an immense reservoir which is being constructed by said company for the purpose of furnishing an unfailing water supply to Denver. The measurements and gauge readings were made by Mr. J. A. Runner, assistant engineer, all the gauging being made by the means of floats. These stations were merely temporary in their nature, it being necessary to move them further up stream whenever the storage of water in the reservoir should be begun. The amount of water available at this point is the sum of the discharges at the two stations.

For the year 1900 records were kept up during practically the entire time by the engineers in charge. Gaugings were made and records kept for both Goose creek and South Platte river, and also of the combined discharge below the junction of the two and below the dam. The discharge at the station below the dam, giving combined flow of both South Platte river and Goose creek, is furnished through the courtesy of Mr. C. L. Harrison, at present chief engineer of the water company. The discharge for February is estimated, but may be considered as closely approximate. Discharges for all other months are from actual measurements, made usually three times a day, but sometimes even oftener than that. The results may be considered as very nearly absolutely correct.

LIST OF DISCHARGE MEASUREMENTS
MADE ON GOOSE CREEK AT CHEESMAN LAKE.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	Sept. 8	J. A. Runner		.95	....	....	21
2	Oct. 8	J. A. Runner	....	.84	....	....	10
3	Nov. 19	J. A. Runner		.72	....	....	8
4	Dec. 3	J. A. Runner		.76	....	....	9

Gaged by floats.

TABLE OF DISCHARGE
OF GOOSE CREEK AT CHEESMAN LAKE.

Year	Stage of Water	MONTH				
		August	September	October	November	December
1899	Maximum	75	20	11	11	9
	Mean	33	14	10	10	8
	Minimum	12	10	10	9	7

NOTE.—October record, 23 days. November record, 12 days. December record, 9 days.

LIST OF DISCHARGE MEASUREMENTS

MADE ON SOUTH PLATTE RIVER AT CHEESMAN LAKE.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	July 31..	J. A. Runner......	......	3.62	....	....	806
2	Sept 8..	J. A. Runner......	......	1.45	....	....	184
3	Oct. 3..	J. A. Runner.. ...	......	1.23	....	....	95
4	Nov. 19..	J. A. Runner......	......	1.30	....	....	107
5	Dec. 5..	J. A. Runner......	......	1.24	....	....	97

Gaged by floats.

TABLE OF DISCHARGE

OF THE SOUTH PLATTE RIVER AT CHEESMAN LAKE.

Year	Stage of Water	MONTH				
		August	September	October	November	December
1899...........	Maximum.......	830	178	145	160	103
	Mean............	321	136	80	115	62
	Minimum.......	154	95	24	46	36

September record, 21 days; October record, 23 days; November record, 12 days; December record, 10 days.

TABLE OF DISCHARGE FOR 1900
OF THE SOUTH PLATTE RIVER BELOW CHEESMAN LAKE.

(Drainage Area equals 1,645.29 Square Miles.)

Stage of Water	MONTH											
	January	February (a)	March	April	May	June	July	August	September	October	November	December
Maximum	27	27	103	547	1,540	1,945	522	126	103	155	90	67
Mean	26	27	80	254	1,038	1,204	208	88	79	84	69	33
Minimum	23	27	27	92	562	550	40	58	63	39	37	18

(a) Estimated.

PLATTE CANON STATION ON SOUTH PLATTE RIVER.

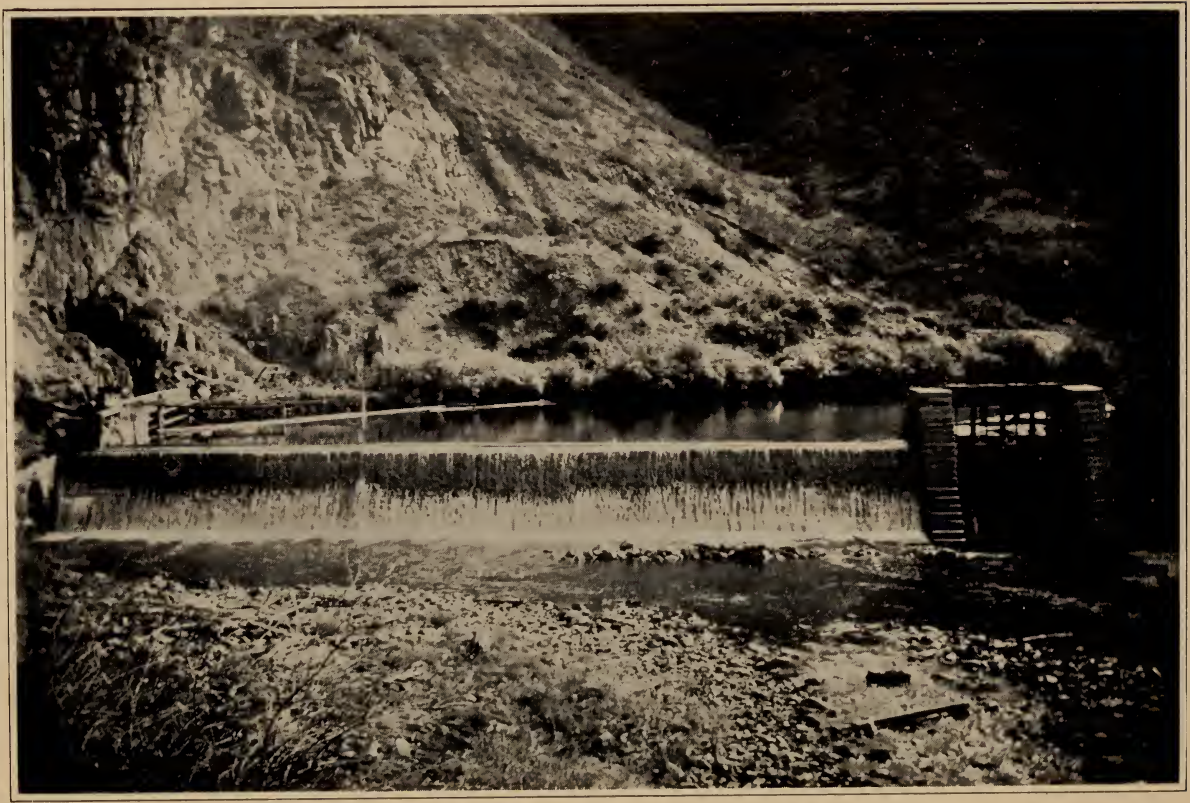
This station is located about three miles above the point where the South Platte river debouches from the mountainous country into the valley region and about the same distance below the old station at Deansbury, of which this station is intended to take the place. Records have been kept here for some time by the Denver Union Water Company, but co-operation with this survey was not begun until April 1, 1899. Readings were taken until June 2, 1900, inclusive, when extremely high water carried away the gauge rod which has not yet been replaced. Measurements of discharge were made from a footbridge constructed by the Denver Union Water Company for the purpose, five measurements being made in 1899 and two in 1900.

The station is an extremely important one and should be kept up with great care. If a permanent station could be made here it would be of the greatest value. The stream flows rapidly for a long distance through the canon over boulders which do not move to any great extent. The observer for some time was Mr. G. E. Carleton, of Littleton. During the summer of 1899 the gauge readings were furnished to the United States weather bureau at Denver by which they were published in the papers.

LIST OF DISCHARGE MEASUREMENTS

MADE ON SOUTH PLATTE RIVER AT PLATTE CANON.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	April 14	J. E. Field	133	1.80	95	5.91	559
2	May 8	A. L. Fellows	88	1.50	80	6.23	500
3	June 10	A. L. Fellows	88	2.90	138	8.19	1,127
4	July 28	A. L. Fellows	133	1.80	103	6.12	633
5	Oct. 4	A. L. Fellows	133	.10	39	3.74	146
	1900						
6	Mar. 5	A. L. Fellows	90	—.40	28	3.11	87
7	April 18	A. L. Fellows	71	1.55	82	5.70	467



DIVERTING WEIR OR DAM OF THE NORTHERN COLORADO IRRIGATION CO., IN PLATTE CANON.

COMPARATIVE TABLE OF DISCHARGE.

SOUTH PLATTE RIVER AT DEANSBURY AND AT PLATTE CANON, COLO.

Month	Stage of Water	1887	1888	1889	1890	1891	1892	1895	1896	1897	1899	1900
January	**Maximum**	--------	--------	--------	--------	--------	--------	--------	138	120	--------	175
	Mean	--------	--------	--------	--------	--------	--------	--------	97	78	--------	98
	Minimum	--------	--------	--------	--------	--------	--------	--------	88	50	--------	68
February	**Maximum**	--------	--------	--------	--------	--------	--------	--------	138	187	--------	68
	Mean	--------	--------	--------	--------	--------	--------	--------	115	73	--------	53
	Minimum	--------	--------	--------	--------	--------	--------	--------	92	55	--------	41
March	**Maximum**	--------	--------	--------	--------	--------	--------	--------	561	236	--------	225
	Mean	--------	--------	--------	--------	--------	--------	--------	207	108	--------	156
	Minimum	--------	--------	--------	--------	--------	--------	--------	100	62	--------	77
April	**Maximum**	395	--------	193	--------	121	--------	--------	473	620	710	2,445
	Mean	295	--------	172	--------	142	--------	--------	983	376	454	826
	Minimum	175	--------	168	--------	165	--------	--------	197	210	236	160
May	**Maximum**	740	--------	788	610	1,483	637	--------	830	1,478	1 009	2,685 (a)
	Mean	470	--------	477	391	1,117	630	--------	502	966	760	2,424
	Minimum	325	--------	183	323	890	620	--------	350	610	386	2,085

(a) No record from May 4 to 15, inclusive.
At Deansbury 1887 to 1897
At Platte Canon 1889 to 1900

COMPARATIVE TABLE OF DISCHARGE.

SOUTH PLATTE RIVER AT DEANSBURY AND AT PLATTE CANON, COLO.—(Concluded.)

Month	Stage of Water	1887	1888	1889	1890	1891	1892	1895	1896	1897	1899	1900
June	Maximum	785	--------	750	536	1,483	962	--------	601	1,481	2,175	(b)
	Mean	535	--------	460	403	1,243	628	--------	281	1,006	1,346	--------
	Minimum	400	--------	300	270	857	376	--------	168	758	850	--------
July	Maximum	575	670	643	780	2,195	973	--------	430	--------	1,845	--------
	Mean	310	545	323	520	645	847	--------	233	--------	1,161	--------
	Minimum	210	450	121	387	328	717	--------	118	--------	596	--------
August	Maximum	425	625	577	652	562	830	--------	291	--------	1,365	--------
	Mean	265	550	210	561	373	535	--------	189	--------	587	--------
	Minimum	145	510	102	360	263	297	--------	118	--------	284	--------
September	Maximum	300	485	230	300	324	764	--------	310	--------	333	--------
	Mean	165	410	129	196	219	328	--------	250	--------	233	--------
	Minimum	95	320	92	128	146	280	--------	198	--------	104	--------
October	Maximum	250	410	168	260	--------	492	--------	198	--------	213	--------
	Mean	185	300	180	172	--------	292	--------	230	--------	154	--------
	Minimum	135	210	100	112	--------	280	--------	217	--------	75	--------
November	Maximum	--------	--------	--------	--------	--------	--------	311	213	--------	213	--------
	Mean	--------	--------	--------	--------	--------	--------	241	169	--------	160	--------
	Minimum	--------	--------	--------	--------	--------	--------	190	132	--------	48	--------

December	Maximum	--------	--------	--------	--------	--------	--------	224	132	--------	284	--------
	Mean	--------	--------	--------	--------	--------	--------	145	127	--------	160	--------
	Minimum	--------	--------	--------	--------	--------	--------	92	118	--------	10	--------

(b) No record after June 2, gage being washed out.
At Deansbury 1887 to 1897.
At Platte Canon 1899 to 1900.

DENVER STATION ON THE SOUTH PLATTE RIVER.

This station is located at the Fifteenth street bridge in the city of Denver, immediately below the mouth of Cherry creek. It was established July 15, 1895, and has been maintained ever since that time. Two rods have been in use during the past year, one being upon the left bank and the other upon the right bank, a short distance below the bridge. Both were inclined rods, but the one upon the left bank was washed out by the high water of June, 1900, which also removed the sandbar in front of the rod upon the right hand side, making it available for low water, which it had not been before, so that since that time the readings have been taken from the latter rod. The river at this point is confined between slag embankments and owing to the sand and shifting bottom is very changeable in its nature, thus rendering frequent changes in the rating tables necessary.

The observations have been made by the water commissioners of water district No. 2, in which Denver is located, Mr. W. J. Southland and his successor, Mr. S. M. Matlock. Seven gaugings were made in 1899 and eleven were made in 1900 at this point.

LIST OF DISCHARGE MEASUREMENTS.

MADE ON SOUTH PLATTE RIVER AT DENVER, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
32	April 12	A. L. Fellows	88	6	155	2.72	422
33	May 11	A. L. Fellows	88	6.03	125	2.85	355
34	June 12	A. L. Fellows	88	6.20	208	3.67	764
35	July 27	A. L. Fellows	133	5.32	89	2.40	213
36	Aug. 4	A. L. Fellows	88	6.93	272	4.41	1,200
37	Sept. 6	A. L. Fellows	133	5.95	129	2.23	288
38	Oct. 5	A. L. Fellows	133	5.10	57	1.76	100
	1900						
39	Mar. 6	A. L. Fellows	90	5.50	97	2.52	244
40	April 12	A. L. Fellows	71	5.90	145	2.60	377
41	April 16	A. L. Fellows	71	7.24	316	4.55	1,439
42	April 20	A. L. Fellows	71	7.10	294	4.74	1,395
43	April 23	A. L. Fellows	71	8.32	622	5.65	3,516
44	June 11	A. L. Fellows	71	8.50	631	5.18	3,270
45	July 25	A. L. Fellows	71	5.45	91	2.83	257
46	Aug. 7	A. L. Fellows	138	5.56	106	2.69	285
47	Aug. 29	A. L. Fellows	71	4.90	65	1.40	90
48	Oct. 20	R. W. Hawley	33	5.50	103	2.19	226
49	Oct. 22	R. W. Hawley	33	5.30	84	1.92	161

COMPARATIVE TABLE OF DISCHARGE.

SOUTH PLATTE RIVER AT DENVER, COLO.

Month	Stage of Water	1895	1896	1897	1898	1899	1900
January	Maximum	----	202	134	334	81	273
	Mean	----	182	92	164	55	204
	Minimum	----	163	57	69	42	173
February	Maximum	----	229	118	201	672	242
	Mean	----	198	66	154	196	193
	Minimum	----	172	16	90	42	160
March	Maximum	----	289	438	185	672	227
	Mean	----	225	201	122	409	184
	Minimum	----	108	67	50	201	136
April	Maximum	----	444	867	759	713	5,570 (a)
	Mean	----	301	482	377	466	1,634
	Minimum	----	239	251	50	288	113
May	Maximum	----	408	1 443	2,308	713	5,163
	Mean	----	291	750	1,444	430	4,187
	Minimum	----	229	403	525	288	3,209

June	Maximum	------------	364	1,478	2,020	1,338	4,348
	Mean	------------	200	1,048	1,552	821	2,817
	Minimum	------------	53	509	309	359	991
July	Maximum	1,490	758	1,222	1,732	1,338	947
	Mean	854	164	409	653	637	370
	Minimum	262	42	67	168	121	113
August	Maximum	1,945	187	2,458	844	1,422	257
	Mean	743	115	574	328	527	148
	Minimum	227	42	141	185	216	51
September	Maximum	1,215	180	421	309	422	273
	Mean	426	145	183	187	286	123
	Minimum	194	108	43	139	121	51
October	Maximum	1,092	180	656	239	145	160
	Mean	698	111	305	146	109	104
	Minimum	468	27	194	69	65	51
November	Maximum	870	126	775	239	288	242
	Mean	455	101	454	131	202	179
	Minimum	163	83	68	69	110	113

(a) On April 29th due to flood.

COMPARATIVE TABLE OF DISCHARGE.

SOUTH PLATTE RIVER AT DENVER, COLO.—(Concluded.)

Month	Stage of Water	1895	1896	1897	1898	1899	1900
December	Maximum	350	126	352	168	250	242
	Mean	204	103	246	98	146	178
	Minimum	108	75	157	50	90	113

ORCHARD STATION ON SOUTH PLATTE RIVER.

This station in water district No. 1 of the South Platte river is located at the wagon bridge one-quarter of a mile southwest of Orchard. It was established in November, 1895, and has been maintained most of the time since then. It is especially valuable, as it gives the discharge at high water stages when there is a supply of water available for storage. The channel of the river is sandy and shifting at this point and frequent changes in the rating table are necessary on this account. On March 17, 1899, the portion of the bridge to which the gauge rod was attached was raised by a gorge of ice, which accounted for the sudden change in the gauge readings at that time. Four measurements were made here in 1889 and four also in 1900. The observer was Mrs. U. E. Foley, of Orchard.

LIST OF DISCHARGE MEASUREMENTS

MADE ON SOUTH PLATTE RIVER AT ORCHARD, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
32	April 14	A. L. Fellows	88	3.20	417	3.02	1,258
33	May 27	A. L. Fellows	88	2.30	92	1.72	158
34	Sept. 12	A. L. Fellows	133	2.05	37	1.53	57
35	Nov. 3	M. D. Williams	13	2.80	....	....	614
	1900						
36	Mar. 7	A. L. Fellows	90	2.85	280	2.39	668
37	April 21	A. L. Fellows	71	5	1,291	3.62	4,674
38	July 23	A. L. Fellows	71	1.35	57	2.74	156
(a) 39	Oct. 27	R. W. Hawley	33	2.70	161	2.01	324

(a) Results doubtful.

COMPARATIVE TABLE OF DISCHARGE.

SOUTH PLATTE RIVER AT ORCHARD, COLO.

Month	Stage of Water	1895	1896	1897	1898	1899	1900
January	Maximum	------------	960	1,116	1,392	3,026	2,834
	Mean	------------	804	625	1,068	2,880	1,634
	Minimum	------------	604	228	523	2,838	614
February	Maximum	------------	1,031	1,116	1,147	3,966	1,909
	Mean	------------	638	557	475	3,321	1.268
	Minimum	------------	550	228	811	2,838	799
March	Maximum	------------	698	262	715	3,966	1,539
	Mean	------------	583	231	574	2,377	683
	Minimum	------------	530	218	523	1,258	452
April	Maximum	------------	818	847	619	1,419	8,939
	Mean	------------	611	527	380	1,325	4,180
	Minimum	------------	530	250	10	1,258	452
May	Maximum	------------	------------	3,630	3,214	1,258	11,159
	Mean	------------	------------	895	1,946	465	8 617
	Minimum	------------	------------	81	10	115	6,164

June	Maximum	....	....	5,160	2 090	3,512	7,459
	Mean	....	....	2,657	776	1,198	4.638
	Minimum	....	....	555	0	9	614
July	Maximum	....	....	1,320	781	2,868	452
	Mean	....	....	347	173	1,593	171
	Minimum	....	....	39	40	267	130
August	Maximum	....	....	2,274	40	2 868	121
	Mean	....	....	807	40	761	114
	Minimum	....	....	147	40	40	113
September	Maximum	....	....	147	113	158	241
	Mean	....	....	92	69	45	142
	Minimum	....	....	61	40	19	113
October	Maximum	....	....	1,294	408	614	452
	Mean	....	....	303	215	429	431
	Minimum	....	....	86	113	158	260
November	Maximum	1,031	....	1,392	3,026	936	799
	Mean	944	....	1,110	811	799	611
	Minimum	818	....	715	288	614	452

COMPARATIVE TABLE OF DISCHARGE.

SOUTH PLATTE RIVER AT ORCHARD, COLO.—(Concluded.)

Month	Stage of Water	1895	1896	1897	1898	1899	1900
December	Maximum	1,031	824	1,930	3,026	2,546	614
	Mean	786	430	1,232	2,651	1,544	614
	Minimum	604	213	475	2,090	936	614

Note –The apparently extremely high water of the period from November 24, 1898, to March 19, 1899, is probably due to mill gorge. It is probable that about 1,300 second feet were actually passing.

JULESBURG STATION ON SOUTH PLATTE RIVER.

A station at this point is most desirable, although none has been maintained here in the past. It is hoped, however, that it may be possible to locate and maintain one here in the coming year. Results that might be obtained would be of the greatest value, as the bridge at which the station would be located is not far from the state line, and knowledge of the discharge passing from Colorado into Nebraska might thus be obtained. The channel is very wide, as it is throughout all the lower portion of the South Platte, and on this account results obtained must necessarily be approximate, but in spite of this fact would be of great value.

Four measurements have been made at this point within the past two years, which are given in the table below.

LIST OF DISCHARGE MEASUREMENTS.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	Sept 14..	A. L. Fellows	----	--------	--------	--------	2
2	Nov. 12..	M. D. Williams ...	----	--------	--------	--------	1,120
	1900						
3	Mar. 8..	A. L. Fellows	90	2.10	824	2.78	2,291
4	Nov. 2..	R. W. Hawley.....	33	--------	--------	--------	76

MORRISON STATION ON BEAR CREEK.

Bear creek is one of the smaller tributaries of the South Platte river, heading in the vicinity of Mt. Evans, about thirty miles in a southwesterly direction from Denver. The stream, while usually small, still drains a considerable portion of very mountainous country which is subject to cloudbursts of a more or less violent nature, so that floods sometimes come down this creek which cause great destruction to property and loss of life. The station is located just above the little town of Morrison. Records have been kept of the flow of water in this creek a portion of each irrigation season since April, 1888, excepting the years 1892, 1893 and 1894. The location of the station was changed, however, on April 16, 1899, to the dam at the head of the pipe line of the Denver Union Water Company. The rod is fastened to the upper side of the dam which diverts the water into the pipe. Owing to the formation of a gravel bar in the summer of 1900, the conditions were for some time radically changed from the normal, and for the greater part of the month of September no readings were taken.

The observer at this station is Mr. S. Hebrew, an employe of the Denver Union Water Company.

LIST OF DISCHARGE MEASUREMENTS
MADE ON BEAR CREEK AT MORRISON, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second	Discharge (in cubic feet per second)
	1899						
15	April 15..	J. E. Field........	133	3.80	29	2.23	64
16	May 9..	A. L. Fellows	88	4.25	37	2.70	99
17	June 6..	A. L. Fellows	88	4.25	31	3.45	107
18	Aug. 5..	A. L. Fellows	133	4.98	50	3.81	192
19	Nov. 14..	A. L. Fellows	133	1.35	5	2.47	13
	1900						
20	Mar. 9..	A. L. Fellows	90	1.40	5	3.40	17
21	April 14..	A. L. Fellows	71	2.85	23	2.04	47
22	April 25..	A. L. Fellows	71	5.80	62	5.92	367
23	Aug. 7..	A. L. Fellows	138	3.20	38	1.65	63
24	Sept. 6..	A. L. Fellows	71	(a)	23	1.05	24

(a) No gage height taken, the conditions being abnormal.

COMPARATIVE TABLE OF DISCHARGE.

BEAR CREEK AT MORRISON, COLO.

Month	Stage of Water	1888	1889	1890	1891	1895	1896	1897	1898	1899	1900
January	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
February	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
March	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
April	Maximum	45	--------	--------	107	--------	86	--------	--------	99	691
	Mean	31	--------	--------	50	--------	49	--------	--------	84	306
	Minimum	25	--------	--------	12	--------	23	--------	--------	56	52
May	Maximum	130	195	68	622	102	71	250	143	153	664
	Mean	95	101	63	195	69	51	152	117	103	487
	Minimum	35	18	53	68	41	34	92	60	41	394

COMPARATIVE TABLE OF DISCHARGE.

BEAR CREEK AT MORRISON, COLO.—(Concluded.)

Month	Stage of Water	1888	1889	1890	1891	1895	1896	1897	1898	1899	1900
June	Maximum	130	137	60	605	274	58	327	182	109	583
	Mean	100	85	31	289	183	32	178	143	93	379
	Minimum	68	53	33	230	122	23	124	117	52	189
July	Maximum	95	72	57	204	249	58	307	208	130	163
	Mean	65	49	34	90	136	33	115	150	86	115
	Minimum	50	28	21	41	73	9	74	91	56	88
August	Maximum	140	76	33	68	238	71	737	117	325	103
	Mean	55	58	24	32	122	53	199	67	104	51
	Minimum	25	36	18	20	58	38	83	47	28	27
September	Maximum	42	--------	26	52	93	71	113	78	44	--------
	Mean	30	--------	20	25	69	50	66	46	31	27(a)
	Minimum	28	--------	18	12	46	38	49	31	22	--------
October	Maximum	--------	--------	26	--------	82	44	74	31	25	42
	Mean	--------	--------	21	--------	61	35	55	29	21	29
	Minimum	--------	--------	18	--------	48	26	49	26	17	20

November	Maximum	--------	--------	19	--------	--------	--------	49	29	--------	25
	Mean	--------	--------	17	--------	--------	--------	34	23	--------	16
	Minimum	--------	--------	15	--------	--------	--------	5	20	--------	10
December	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	17
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	15
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	14

1899, April record, 16th to 30th only; October 1st to 21st.
1900, April 14th to 30th.
(a) Estimated, records being given on September 1st and 30th only.
Note.—Only four observations taken in December from 1st to 4th, inclusive.

FORKSCREEK STATION ON CLEAR CREEK.

This station is located at the Forkscreek railway station on the Colorado & Southern railway, in Clear Creek canon, at a point just below the junction of the north and south forks of Clear creek. It was established May 29, 1899, although some measurements had been made at lower points in previous years, the records of which gaugings and reports are not given in the table. The station at Forkscreek has been maintained during the irrigation seasons of 1899 and 1900. The gauge consists of a weight fastened to a wire running over a pulley at the edge of the embankment upon which the railway station is placed. The gauge is referred to bench marks back of the embankment. The stream flows rapidly through this portion of the canon. There is no suitable means for crossing the river at the gauge station, as the railway bridge crosses at a sharp angle. It is possible, however, to secure fairly good results by means of measurements made at the two bridges above the forks, thus securing data of the flow of the two branches separately. At low water the stream is gauged by wading.

The observer for the past two years has been Mr. C. N. Davis, railway station agent at this point. He has voluntarily made the readings, sending daily reports to the United States Weather Bureau in Denver.

LIST OF DISCHARGE MEASUREMENTS

MADE ON CLEAR CREEK AT FORKSCREEK, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	Mar. 29	J. E. Field	88	1.50	20	2.69	52
2	April 20	J. E. Field	133	2.10	45	3.41	155
3	May 10	A. L. Fellows	88	2.75	114	3.21	365
4	June 7	A. L. Fellows	88	3.70	172	4.53	779
5	Aug. 12	A. L. Fellows	133	3.08	117	3.84	449
6	Nov. 15	A. L. Fellows	133	1.70	33	2.04	67
	1900						
7	Mar. 10	A. L. Fellows	90	1.60	21	2.62	55
8	April 13	A. L. Fellows	71	1.70	23	3.17	73
9	April 24	A. L. Fellows	71	2.60	61	4.75	290
10	Aug. 27	A. L. Fellows	71	1.78	61	2.13	130

COMPARATIVE TABLE OF DISCHARGE

CLEAR CREEK AT FORKSCREEK, COLO.

Month	Stage of Water	1899	1900
January	Maximum	------------	------------
	Mean	------------	------------
	Minimum	------------	------------
February	Maximum	------------	------------
	Mean	------------	------------
	Minimum	------------	------------
March	Maximum	------------	75 (c)
	Mean	------------	60
	Minimum	------------	44
April	Maximum	403	403
	Mean	180	178
	Minimum	51	58
May	Maximum	1,202 (a)	1,259
	Mean	581	789
	Minimum	182	367
June	Maximum	1,373 (b)	1.259
	Mean	1,081	968
	Minimum	775	719
July	Maximum	1,202	719
	Mean	791	378
	Minimum	614	235
August	Maximum	692	235
	Mean	420	137
	Minimum	299	84
September	Maximum	349	75
	Mean	214	58
	Minimum	155	44
October	Maximum	155	75
	Mean	141	58
	Minimum	133	51

(a) May 20th to 31st, no record.
(b) June 1st to 6th, no record.
(c) March 1st to 9th, no record.

COMPARATIVE TABLE OF DISCHARGE

CLEAR CREEK AT FORKSCREEK, COLO.—Concluded.

Month	Stage of Water	1899	1900
November	Maximum	155	58
	Mean	77	52
	Minimum	32	51
December	Maximum	------------	51 (d)
	Mean	------------	51
	Minimum	------------	51

(d) December 1st to 4th, inclusive.

MARSHALL STATION ON SOUTH BOULDER CREEK.

South Boulder creek, which is the next stream of importance flowing from the mountains north of Clear creek, has been measured for some time at a point at the mouth of the canon, about three miles west of the railway station of Marshall, on the Colorado & Southern railway. The station was located in April, 1888, and has been maintained during a portion of each year since that time excepting the years 1893 and 1894. The rod consists of an inclined timber on the north bank of the stream, near the house of C. E. Barber. Two ditches divert water at points above the station, viz.: The South Boulder and Coal Creek Ditch, and the Community Ditch, and their discharges must be added to the discharge as found at the station to determine the run-off of the basin. The channel of the stream is rocky and full of boulders, and does not change materially. Gaugings are usually made by wading, but at high water may be made from the foot bridge just above the rod.

The observer in 1899 was C. E. Barber, the readings being made in 1900 by Miss Blanche Barber.

LIST OF DISCHARGE MEASUREMENTS
MADE ON SOUTH BOULDER CREEK AT MARSHALL, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
19	April 22..	J. E. Field........	133	1.70	43	2.64	115
20	May 6..	A. L. Fellows	88	1.55	33	2.94	96
21	June 15..	A. L. Fellows	88	2.80	80	5.64	451
22	Aug. 10..	A. L. Fellows	133	1.60	40	2.75	109
23	Oct. 10..	A. L. Fellows	88	.70	8	.85	7
	1900						
24	July 28..	A. L. Fellows	71	1.40	21	1.67	35
25	Aug. 28..	A. L. Fellows	71	1.10	10	1	10

COMPARATIVE TABLE OF DISCHARGE

SOUTH BOULDER CREEK AT MARSHALL, COLO.

Month	Stage of Water	1888	1889	1890	1891	1892	1895	1896	1897	1898	1899	1900
January	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
February	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
March	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
April	Maximum	100	--------	--------	165	--------	--------	167	--------	--------	262	--------
	Mean	175	--------	--------	58	237	--------	72	--------	--------	115	--------
	Minimum	40	--------	--------	15	--------	--------	18	--------	--------	20	--------
May	Maximum	170	560	476	565	391	445	603	527	276	413	--------
	Mean	135	475	313	366	237	238	219	297	194	278	850 (a)
	Minimum	90	402	175	141	39	148	97	120	36	102	--------
June	Maximum	225	534	503	464	561	1,090	358	595	365	536	582 (b)
	Mean	185	335	349	356	374	531	204	401	285	416	356
	Minimum	140	220	270	238	244	261	105	303	226	277	207

	Maximum	150	323	264	256	480	314	105	435	238	394	207
July	Mean	130	151	143	140	232	205	75	234	137	243	93
	Minimum	105	49	68	76	111	130	52	120	64	94	34
	Maximum	205	74	106	74	107	166	167	290	78	193	55 (c)
August	Mean	98	38	64	45	62	99	43	129	42	91	29
	Miuimum	58	23	43	24	31	62	27	65	18	49	5
	Maximum	60	26	67	28	30	77	46	65	52	60	17
September	Mean	40	21	39	20	21	37	37	43	22	35	9
	Minimum	30	19	19	15	15	20	31	22	12	20	5
	Maximum	....	61	38	21	30	84	31	65	31	....	....
October	Mean	....	20	31	19	18	36	23	39	20	....	....
	Minimum	....	15	28	18	16	14	18	18	9	....	....
	Maximum	....	....	....	....	....	....	....	52	26	....	....
November	Mean	....	....	....	....	....	....	....	35	18	....	....
	Minimum	....	....	....	....	....	....	....	18	9	....	....
	Maximum	....	....	....	....	....	....	....	....	....	....	....
December	Mean	....	....	....	....	....	....	....	....	....	....	....
	Minimum	....	....	....	....	....	....	....	....	....	....	....

(a) Average for week from May 6 to 12, inclusive
(b) June 3 to 23, inclusive.
(c) No record August 12 to 18, inclusive.

TABLE OF MEAN DISCHARGE

OF THE "COMMUNITY" AND "SOUTH BOULDER AND COAL CREEK" DITCHES.

DITCH AND YEAR	May	June	July	August
Community 1897	22	21	--------	--------
South Boulder and Coal Creek 1897	24	36	--------	--------
Community 1898	9	12	--------	--------
South Boulder and Coal Creek 1898	20	35	21	--------
Community 1899	40	40	26	----
South Boulder and Coal Creek 1899	39	83	56	33

BOULDER STATION ON BOULDER CREEK.

The next stream of importance issuing from the mountains north of South Boulder creek is Boulder creek, into which the South Boulder flows. This stream is measured at a point in the mouth of the canon about one and one-half miles above the town of Boulder. Measurements have been made at this point since April, 1888, and have been kept up ever since that time, excepting during the years of 1893 and 1894. The rod consists of an inclined timber on the left bank of the stream, a short distance below the bridge at the mouth of the canon. There are two small ditches taken out above this point, but the amounts of water carried in them are so small that they may be practically disregarded. The channel of the stream consists of large boulders, and accurate measurements are difficult to obtain at this or any other point upon the stream. Measurements are made from the bridge during high water, but at low stages the stream may be gauged by wading.

The observer for the past two years was Mrs. Carrie Osgood, who lives near the rod. The discharge, both of the Boulder and of the South Boulder creeks is used almost entirely for irrigation, excepting in the flood stages. There being at the low water stages an insufficient supply, projects are now being contemplated for the storage of the flood waters in this basin.

LIST OF DISCHARGE MEASUREMENTS
MADE ON BOULDER CREEK AT BOULDER, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
16	April 21	J. E. Field	133	1.00	40	2.08	84
17	May 6	A. L. Fellows	88	1.20	53	2.56	134
18	June 15	A. L. Fellows	88	2.50	80	8.02	642
19	Aug. 10	A. L. Fellows	133	1.70	86	3.20	276
20	Oct. 20	A. L. Fellows	88	.50	26	1.40	36
	1900						
21	April 28	A. L. Fellows	71	2.10	91	5.31	483
22	July 27	A. L. Fellows	71	1.40	72	3.06	220
23	Aug. 28	A. L. Fellows	71	.62	36	1.36	49

COMPARATIVE TABLE OF DISCHARGE
OF BOULDER CREEK AT BOULDER, COLO.

Month	Stage of Water	1888	1889	1890	1891	1892	1895	1896	1897	1898	1899	1900
January	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
February	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
March	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
April	Maximum	170	--------	--------	--------	--------	--------	292	--------	--------	269	--------
	Mean	81	--------	--------	--------	--------	--------	80	--------	--------	117	--------
	Minimum	25	--------	--------	--------	--------	--------	7	--------	--------	21	--------
May	Maximnm	215	785	425	435	373	421	809	615	392	495	769
	Mean	164	676	287	327	336	316	240	357	233	353	625
	Minimum	125	90	125	224	300	229	87	164	75	133	502
June	Maximum	350	770	453	467	646	750	466	979	550	826	801
	Mean	261	565	341	427	447	502	264	552	388	665	640
	Minimum	200	417	218	332	292	382	141	351	225	403	475

July	Maximum	255	599	319	373	529	550	250	697	350	847	414
	Mean	210	277	258	240	372	355	150	378	211	577	255
	Minimum	180	114	142	146	224	261	101	224	75	366	167
August	Maximum	270	169	1,200	177	224	345	218	460	184	619	167
	Mean	157	97	173	116	148	205	88	215	61	265	94
	Minimum	115	55	75	69	69	132	46	103	29	123	47
September	Maximum	120	72	131	81	64	145	108	148	93	217	154
	Mean	80	34	56	61	47	86	73	83	30	87	54
	Minimum	55	16	33	54	41	58	46	53	5	36	28
October	Maximum	100	58	45	....	50	114	51	92	20	50	69
	Mean	60	36	33	....	43	44	33	52	6	39	33
	Minimum	55	28	26	....	27	5	20	32	4	30	7
November	Maximum	....	....	30	....	....	....	....	95	138	34	....
	Mean	....	....	26	....	....	....	....	42	41	24	....
	Minimum	....	....	24	....	....	....	....	25	3	13	....
December	Maximum	....	....	....	....	....	....	....	....	....	....	....
	Mean	....	....	....	....	....	....	....	....	....	....	....
	Minimum	....	....	....	....	....	....	....	....	....	....	....

LYONS STATION ON ST. VRAIN CREEK.

The united waters of the Boulder and the South Boulder creeks flow into the St. Vrain creek, which is the next important tributary issuing from the mountains to the north of the Boulder. The gauging station on this stream is located about one-half mile southeast of Lyons, below the intersection of the north and south forks of St. Vrain creek. Records have been kept up at or near this point since April, 1888, excepting during the years 1893 and 1894, but the present station in its existing condition was established May 5, 1899, since which time the records have been regularly kept up. The rod is an inclined timber on the left bank of the stream, opposite the Tower hotel, fastened to pieces of timber driven into the slag embankment. The stream has an excellent channel of gravel and boulders and is not liable to change. Measurements have usually been made by wading, but may at high water be made from the bridge about one-fourth of a mile below the gauge rod.

The observer in 1899 was Miss Bessie Sites. In 1900 Mr. L. H. Dickson, commissioner of the St. Vrain water district, has been keeping up the readings. Weekly records of the discharge at this point have been furnished to the Longmont papers. During the greater part of the irrigating season the discharge of St. Vrain creek is exhausted, but during the flood period considerable water usually goes to waste. Much of the water is, however, stored in reservoirs and is used to good advantage at lower stages.

LIST OF DISCHARGE MEASUREMENTS

MADE ON ST. VRAIN CREEK AT LYONS, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
18	April 18..	J. E. Field	133	3	92	2.35	217
19	May 5..	A. L. Fellows....	88	2.75	47	2.91	137
20	June 14..	A. L, Fellows....	88	4.15	113	7.33	825
21	Aug. 9..	A. L. Fellows....	133	3.20	86	3.06	263
22	Oct. 7..	A. L. Fellows....	133	2.10	39	.95	37
	1900						
23	Mar. 13..	A. L. Fellows....	90	2.06	37	.95	35
24	April 27..	A. L. Fellows....	71	3.68	101	5.08	513
25	July 27..	A. L. Fellows....	71	2.70	70	2.76	193

COMPARATIVE TABLE OF DISCHARGE

OF ST. VRAIN CREEK AT LYONS, COLO.

Month	Stage of Water	1888	1889	1890	1891	1892	1895	1896	1897	1898	1899	1900
January	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
February	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
March	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	33 (a)
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	16
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	10
April	Maximum	115	--------	--------	--------	--------	--------	247	--------	--------	508	918 (b)
	Mean	72	--------	--------	--------	--------	--------	74	--------	--------	215	361
	Minimum	30	--------	--------	--------	--------	--------	5	--------	--------	31	10
May	Maximum	210	493	590	--------	321	--------	573	786	333	353	882
	Mean	156	465	376	--------	303	--------	229	494	212	260	634
	Minimum	87	390	29	--------	190	--------	103	345	31	104	447

COMPARATIVE TABLE OF DISCHARGE

OF ST. VRAIN CREEK AT LYONS, COLO.—(Concluded.)

Month	Stage of Water	1888	1889	1890	1891	1892	1895	1896	1897	1898	1899	1900
June	Maximum	485	500	675	433	620	1,040	417	980	551	1,145	810
	Mean	320	371	436	165	382	711	320	668	431	739	623
	Minimum	210	286	291	Apr 31	166	430	195	447	269	327	429
July	Maximum	280	301	410	1,397	540	680	417	860	372	985	447
	Mean	208	197	292	629	313	410	212	460	227	650	270
	Minimum	150	90	177	May 355	156	259	116	294	64	384	179
August	Maximum	270	175	252	1,297	167	488	529	548	154	761	152
	Mean	133	102	199	June 1,046	95	229	154	274	102	299	97
	Minimum	85	64	93	740	59	134	47	143	40	104	52
September	Maximum	97	64	158	988	87	125	373	180	128	123	207
	Mean	56	44	66	July 516	59	93	129	123	60	85	65
	Minimum	45	33	37	230	33	72	67	75	11	31	37
October	Maximum	70	67	63	220	87	230	90	75	22	57	88
	Mean	50	39	45	Aug 151	40	189	55	48	15	40	47
	Minimum	30	26	37	75	33	80	5	28	11	19	31

November	Maximum	--------	--------	37	164	--------	--------	--------	54	22	37	31 (c)
	Mean	--------	--------	30	96	--------	--------	--------	35	13	21	30
	Minimum	--------	--------	18	50	--------	--------	--------	28	6	13	23
December	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

(a) March, 1900, 6 days' record.

(b) April 1 to 7, and 9 to 14, no record.

(c) Record from November 1 to 12, inclusive.

TABLE OF MEAN DISCHARGE
OF THE SUPPLY DITCH AT LYONS, COLO.

Year	April	May	June	July	Aug.	Sept.	Oct.	Nov.
1897	....	61	98	49	29	4	3	2
1898	....	32	52	32	9	7	7	8
1899	7	40	90	84	31	10	4	3
1900	....	23	106	20	10	7	2	1

ARKINS STATION ON BIG THOMPSON CREEK.

This stream drains the country immediately north of that drained by the head waters of the St. Vrain creek, and is one of the largest tributaries of the South Platte river. The Big Thompson and the Little Thompson together form irrigation district No. 4, uniting near the lower end of the district, so that the distribution of the water in each of the two streams is regulated independently of the other.

The gauging station on the Big Thompson is located about three miles south of the postoffice at Arkins. Measurements have been kept up at or near this point since April, 1888, with the exception of the years 1893 and 1894. It was relocated at its present position April 1, 1899, so that the headgate of the Home Supply ditch is now below the gauging station, although that of the Handy ditch is still above. It is necessary, therefore, to include the discharge of this latter canal to get the total run-off of the stream. The rod is a vertical 2x4 fastened to the down stream side on the right-hand end of the wagon bridge upon the ranch of Mr. John Chasteen. The bench mark is twenty-five feet south of the gauge and is 9.35 feet above the zero mark. The channel of the stream consists of boulders and is quite rough, but being little liable to change, furnishes a good point for accurate measurements. A permanent station could be located here to good advantage.

The observer during the year 1899 was Mr. Ed Chasteen. During 1900 the records have been kept up by Mr. J. M. Wolaver, the commissioner of water district No. 4. The discharge of the Handy ditch is given, as well as that of the stream itself. The waters of the Big Thompson, as of all the other tributaries of the South Platte river, are entirely used during the irrigating season for the irrigation of the lands along its valley, and but little of it goes to waste, even during the high water stage, as the greater part of it is diverted into large reservoirs, from which it is used to good advantage late in the season.

LIST OF DISCHARGE MEASUREMENTS

MADE ON BIG THOMPSON CREEK AT ARKINS, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
17	April 17	J. E. Field	133	.90	71	2.01	143
18	May 4	A. L. Fellows	88	.97	68	2.56	173
19	June 13	A. L. Fellows	88	2.55	155	6.07	941
20	Aug. 8	A. L. Fellows	133	1.73	120	3.38	406
21	Oct. 6	A. L. Fellows	133	.50	38	.90	34
	1900						
22	April 26	A. L. Fellows	71	1.91	123	4.16	512
23	July 26	A. L. Fellows	71	1.35	110	2.91	322

COMPARATIVE TABLE OF DISCHARGE

OF BIG THOMPSON CREEK AT ARKINS, COLO.

Month	Stage of Water	1888	1889	1890	1891	1892	1895	1896	1897	1898	1899	1900
January	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
February	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
March	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
April	Maximum	110	--------	--------	--------	--------	--------	74	--------	--------	331	1,990
	Mean	62	--------	--------	--------	--------	--------	37	--------	--------	140	412
	Minimum	10	--------	--------	--------	--------	--------	5	--------	--------	4	4
May	Maximum	260	546	707	--------	482	420	911	666	341	510	2,090
	Mean	132	359	436	--------	312	318	218	420	164	303	1,382
	Minimum	50	130	225	--------	195	217	5	64	13	146	895
June	Maximum	760	527	712	1,182	1,195	823	483	850	605	1,685	1,990
	Mean	458	382	530	817	704	570	285	465	377	917	1,362
	Minimum	200	208	365	523	329	344	180	36	85	451	737

July	Maximum	410	370	1,603	634	864	778	403	459	517	1,189	556
	Mean	275	200	454	383	493	465	225	267	238	653	349
	Minimum	160	108	255	219	259	293	152	146	85	416	208
August	Maximum	580	137	643	235	247	696	443	390	177	589	208
	Mean	190	89	393	159	150	319	144	133	79	283	137
	Minimum	100	53	185	105	81	174	38	36	45	116	88
September	Maximum	180	59	235	137	90	217	195	85	98	146	88
	Mean	75	49	151	95	49	146	119	37	36	92	77
	Minimum	60	40	65	69	39	32	74	15	8	35	60
October	Maximum	100	50	97	--------	--------	132	138	48	21	116 (a)	--------
	Mean	46	46	67	--------	--------	79	66	17	13	64	--------
	Minimum	40	28	51	--------	--------	20	20	5	4	35	--------
November	Maximum	--------	--------	100	--------	--------	--------	--------	64	24	--------	--------
	Mean	--------	--------	83	--------	--------	--------	--------	27	8	--------	--------
	Minimum	--------	--------	60	--------	--------	--------	--------	5	4	--------	--------
December	Maximum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

(a) October 1st to 7th no record.

TABLE OF MEAN DISCHARGE
OF THE HANDY AND HOME SUPPLY DITCHES.

Ditch and Year	April	May	June	July	Aug.	Sept.	Oct.	Nov.
Home Supply............1897	......	83	105	41	21	14	11	......
Handy..................1897	......	87	109	71	42	20	26	......
Home Supply............1898	......	36	34	40	18	11	......	......
Handy,.................1898	......	31	87	39	15	10	10	9
Handy..................1899	162	50	120	113	33	11	......	......
Handy..................1900	......	......	135	30	12	10	......	......

FORT COLLINS STATION ON CACHE LA POUDRE RIVER.

This stream is the northernmost and the largest of the tributaries of the South Platte issuing from the east front of the Rocky mountains. Its discharge during the irrigating season is augmented by a supply diverted from the head waters of the Laramie river, which heads immediately to the west of the head waters of the Cache a la Poudre, the diversion being made through a canal known as the Sky Line canal. The measurements of discharge of the Cache a la Poudre basin, therefore, include some of the Laramie waters.

The gauging station was established in 1884 at a point about fifteen miles above Fort Collins, and the work has been carried on since that time under the direction of Professor L. G. Carpenter, of the Colorado State Agricultural College. The following table has been compiled from the records furnished by Professor Carpenter, and includes the years 1895 to 1900, inclusive.

The waters of the Cache a la Poudre, like those of other tributaries of the South Platte, are practically all consumed for the purpose of irrigation, even the flood waters being stored very extensively for use later in the season. It is along the valley of the Cache a la Poudre that the earliest and best irrigation of the state has been carried on.

COMPARATIVE TABLE OF DISCHARGE

OF THE CACHE A LA POUDRE AT FORT COLLINS, COLO.

Year	Stage of Water	MONTH						
		April	May	June	July	Aug.	Sept.	Oct.
1895	Maximum	....	2,060	3,450	1,690	846	357	....
	Mean	....	1,437	2,497	1,130	495	224	....
	Minimum	....	1,100	1,715	707	312	174	....
1896	Maximum	....	....	981	617	517	411	....
	Mean	....	....	773	458	272	292	....
	Minimum	....	....	559	348	158	208	....
1897	Maximum	810	3,155	3,013	1,051	466	203	....
	Mean	727	2,105	1,739	749	371	177	....
	Minimum	669	862	1,043	404	248	142	....
1898	Maximum	316	1,308	1,658	893	258	112	84
	Mean	306	671	1,330	481	184	78	59
	Minimum	294	206	824	210	115	43	35
1899	Maximum	....	2,015	3,968	2,701	974	365	165
	Mean	....	1,486	2,632	1,441	557	212	117
	Minimum	....	636	1,472	809	281	120	92

COMPARATIVE TABLE OF DISCHARGE

OF THE CACHE A LA POUDRE AT FORT COLLINS, COLO.—(Concluded.)

Year	Stage of Water	MONTH						
		April	May	June	July	Aug.	Sept.	Oct.
1900	Maximum	2,934	4,560	4,376	1,360	460	260	141
	Mean	1,376	2,809	2,942	721	265	149	132
	Minimum	427	2,049	1,325	460	195	113	122

NOTE—1895 record begins May 15 and ends September 24; 1896, June 17 to September 22; 1897, April 27 to August 2 (August and September estimated); 1898, April 27 to August 9 (balance approximate); 1899, May 10 to October 24; 1900, April 18 to October 16.

ARKANSAS IRRIGATION DIVISION.

The Arkansas river and its tributaries drain practically all of the southwestern quarter of the state of Colorado. The main stream heads in the vicinity of Tennessee Pass, in the central portion of the state; thence it flows southerly about seventy miles, then easterly about fifty miles to Canon City, receiving a number of tributaries from the mountainous area on either side. At Canon it suddenly emerges from the main mountainous area and thence it flows in an easterly direction through Pueblo, where it enters the great plains of Eastern Colorado, which it traverses. In this section most of the water of the Arkansas is diverted for irrigation, even the flood stages being mostly used and stored, so that little water, excepting at the very highest stages, flows out of the state. There is still, however, a considerable discharge during the months of April and May, and this was particularly true of the year 1900, when, owing to the heavy rains over the eastern half of Colorado, the discharge of the stream was abnormal and vast quantities of the waters flowed into the Gulf of Mexico through this source.

As in the case of the South Platte river, the tributaries consist of two classes, those issuing from the mountains, which have a perennial flow, and those which drain the great plains, receiving water only in times of rain or in the early spring.

Of the first class are Lake creek, Badger creek and Grape creek, while Fountain creek, St. Charles river, Huerfano river, Apishapa river and Purgatoire river receive a portion of their supply from the plains as well as from the mountains.

Of the second class are such water courses as Horse creek, Adobe creek, Big Sandy creek, Tempas creek and many others of lesser note. The drainage from the plains is at times enormous, but usually the water courses in this district are dry. Floods have been estimated from some of these creeks to be at least ten thousand cubic feet per second. Of the streams which head in the mountains, but flow for long distances through the plains, the normal discharge is invariably used for irrigation, the water discharging into the Arkansas only in flood seasons. Much water is being stored along the Arkansas in the reservoirs of the Great Plains Water Company, and at Twin Lakes, while other reservoirs of importance, but of smaller size, are also filled during the flood seasons. Water might, however, be stored to a greater extent by building canals large enough to receive the water of the plains and conduct it to proper reservoirs.

A number of stations have been maintained along the Arkansas and its tributaries, which will be described in their regular order. Those along the lower Arkansas were maintained with the assistance and co-operation of the Great Plains Water Company, one of the engineers of which, Mr. C. W. Beach, has made many measurements. The seepage of the Arkansas basin furnishes an interesting problem which is being investigated by Professor L. G. Carpenter in co-operation with your office. Studies of underground supply have also been made, the results of which have been published in the United States geological survey reports.

The principal projects which have been under way in this division are those of the Great Plains Water Company and of the Colorado Land and Water Company, the former completing their system of reservoirs about twelve miles north of Lamar, and the latter completing its great reservoir at Twin Lakes. Both of these systems were in use during the past summer, and measurements and rating tables for the discharge for the Twin Lakes reservoir were made under your direction which will be given below.

TWIN LAKES STATIONS ON LAKE CREEK.

This creek, which is the principal tributary of the Arkansas river near its head, enters it just above Granite. Measurements were inaugurated upon this creek June 21, 1899, by Mr. O. O. McReynolds, chief engineer of the Colorado Land and Water Company, who has had charge of the work upon the reservoir of Twin Lakes. It was at first contemplated that measurements should be made showing the discharge into the upper lakes, between the lakes, and below the lower lake, but owing to the difficulties encountered only a few measurements were made at the two upper points, and no daily readings were made. Daily records were kept at the lower station during a portion of 1899, and in 1900 the stations were newly located and records were kept up for a portion of the year, both at a point between the lakes and at a point below the lower lake—the former being called Interlaken station, and the second the lower Twin Lakes station. The object of these two stations is to determine the flow into the lower lake and also the discharge from the lower lake, so that the amount due the Colorado Land & Water Company, as stored water, may be ascertained at any time; furthermore, so that it may be possible to determine what amount the company shall turn from the lake. Whenever the company shall begin to store water in the upper lake, it will also be necessary to establish a gauging station above this lake to determine the inflow.

The Interlaken station is located at a dam built across the channel between the two lakes, making a permanent water way so far as the last season was concerned. Gaugings are made by wading.

The Lower station is located below the junction of the natural outlet of the lake and the cut from the lake, which is controlled by the Water Company's dam. The channel is of boulders and is fairly permanent. Gaugings are usually made from a footbridge constructed at this point.

LIST OF DISCHARGE MEASUREMENTS

MADE ON LAKE CREEK AT TWIN LAKES, COLO.

	Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second	Discharge (in cubic feet per second
At Old Station No. 1 (a)	1	1899 July 17	A. L. Fellows	88	2.80	118	2.32	273
	2	Oct. 12	A. L. Fellows	138	1.90	54	.50	27
At Old Station No. 2 (b)	1	1899 June 21	O. O. McReynolds	138	3.60	255	3.97	1,007
	2	July 17	A. L. Fellows	88	1.90	145	2.58	374
	3	Oct. 12	A. L. Fellows	138	1.40	99	.43	42
	4	1900 July 9	A. L. Fellows	71	1.70	128	1.59	203
	5	July 16	O. O. McReynolds	136	1	90	1.62	146
Interlaken Station (c)	1	1900 July 10	A. L. Fellows	71	.85	144	1.72	248
	2	July 18	A. L. Fellows	71	.50	98	1.24	122
	3	Aug. 3	O. O. McReynolds	136	.25	79	.67	52
	4	Sept. 4	C. W. Beach	90	.15	19	1.31	25
Old Station No. 3 (d)	1	1899 June 21	O. O. McReynolds	138	3.80	504	2.40	1,208
	2	June 27	O. O. McReynolds	138	3.20	404	1.72	696
	3	July 17	A. L. Fellows	88	2.55	304	1.29	391
	4	July 24	O. O. McReynolds	138	2.50	306	112	344
	5	Aug. 14	O. O. McReynolds	138	2.50	297	.62	183
	6	Oct. 13	A. L. Fellows	133	------	35	.62	22
	7	1900 July 10	A. L. Fellows	71	2.50	302	.64	193
Lower Twin Lakes Station (e)	1	1900 July 16	O. O. McReynolds	136	2.40	93	2.63	245
	2	July 18	A. L. Fellows	71	2.35	85	2.47	210
	3	July 18	A. L. Fellows	71	2.50	92	2.83	260
	4	July 18	A. L. Fellows	71	1.97	66	1.79	118
	5	Aug. 11	O. O. McReynolds	136	2.13	76	2.06	156
	6	Sept. 4	C. W. Beach	90	1.30	27	.91	25

(a) Station in channel above upper lake.
(b) Station at bridge over channel between lakes.
(c) Station at head of channel between lakes.
(d) Station at head of old channel discharging from lower lake.
(e) Station below junction of old channel and new cut discharging from lower lake.

TABLE OF DISCHARGE
OF LAKE CREEK AT TWIN LAKES, COLO.

Month	Stage of Water	Year 1900 (*)	Year 1899	Year 1900 (*)
		Interlaken Station	Old Station No. 3	Lower Lake Creek Station
June	Maximum	------------	1,208	------------
	Mean	------------	849 †	------------
	Minimum	------------	639	------------
July	Maximum	106	667	228
	Mean	86	487 ‡	206
	Minimum	65	370	63
August	Maximum	59	------------	182
	Mean	43	------------	119
	Minimum	36	------------	40
September	Maximum	36	------------	35
	Mean	36	------------	35
	Minimum	36	------------	35

* Record in 1900, July 22d to September 8th, inclusive.

† Record from 21st to 30th. ‡ Record from 1st to 20th.

GRANITE STATION ON ARKANSAS RIVER.

This station is located at a wagon bridge near the Denver & Rio Grande railroad station at Granite, the gauge rod being fastened to this bridge. Owing to the unsatisfactory nature of the channel of the stream, few measurements have been made and records have been kept up very irregularly. The changes through the shifting of gravel bars in the channel are so great that it has been impossible to make a rating table for the past two years, and no effort has been made to keep up measurements during the year 1900.

The gauge readings of 1899 were made by W. R. Reed, station agent of the Denver & Rio Grande railroad.

LIST OF DISCHARGE MEASUREMENTS

MADE ON ARKANSAS RIVER AT GRANITE, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
14	May 25..	A. L. Fellows....	88	5 (a)	215	6.86	1,476
15	July 15..	A. L. Fellows....	88	2.80	154	7.67	1,178
16	Oct. 14..	A. L. Fellows....	133	1.60	67	1.94	130
	1900						
17	July 9...	A. L. Fellows....	71	(b)	137	4.16	570

(a) Approximate.

(b) Gage not read owing to change of channel.

COMPARATIVE TABLE OF DISCHARGE
OF THE ARKANSAS RIVER AT GRANITE, COLO.

Year	Stage of Water	MONTH					
		May	June	July	August	September	October
1897	Maximum	2,058	2,240	1.096	546	358	114
	Mean	1,114	1,464	719	350	169	114
	Minimum	268	923	442	176	114	114
1898	Maximum	.....	.....	.....	151	93	.....
	Mean	.....	.....	.....	113	45	.....
	Minimum	.....	.....	.....	75	8	.....

TABLE OF GAGE HEIGHTS.

Year	Stage of Water	March	April	May	June	July	August	September
1899	Maximum	3.30	4	6	6.95	3.90	2.60	.....
	Mean	3.21	3.50	4.87	5.27	3.08	2.23	2
	Minimum	3.10	3.15	3.80	3.90	2.60	2	.....

SALIDA STATION ON ARKANSAS RIVER.

This station is located at a foot bridge near the railroad shops at Salida. It was established April 11, 1895, and has been maintained quite regularly since that time—no readings being made in the winter time, however. The gauge rod is fastened to the north side of this foot bridge, but considerable difficulty has been experienced by its being knocked out by ice and by logs in high water. The station is an important one and should be made permanent by clearing the channel of some large boulders which interfere materially with the accuracy of the measurements at this point. If these boulders were removed and a heavy inclined timber laid on the left bank of the stream, accurate results might be obtained. The stream is very swift at this point, but the channel is straight and the discharge may be readily measured from the foot bridge. Little water is used above this point and very little is used below until Canon City is reached.

The observer at this point is William Furniss, who has made the readings for the past two years.

LIST OF DISCHARGE MEASUREMENTS

MADE ON THE ARKANSAS RIVER AT SALIDA, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
20	April 26..	A. L. Fellows....	88	1.72	176	3.90	686
21	May 25..	A. L. Fellows....	88	3.10	283	7.06	1,999
* 22	July 14..	A. L. Fellows....	88	2.40	303	5.94	1,801
23	Nov. 8..	A, L. Fellows....	133	.80	150	2.11	317
	1900						
24	Mar. 15..	A. L. Fellows....	90	.90	136	1.99	271
25	June 14..	A. L. Fellows....	71	4.30	438	6.93	3,036
26	Aug. 8..	A. L. Fellows....	138	1.08	165	2.68	443
27	Aug. 22..	A. L. Fellows....	71	.87½	154	2.37	364

* Doubtful as to gage height.

COMPARATIVE TABLE OF DISCHARGE
OF THE ARKANSAS RIVER AT SALIDA, COLO.

Month	Stage of Water	1895	1897	1898	1899	1900
January	Maximum	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------
February	Maximum	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------
March	Maximum	--------	--------	--------	342	--------
	Mean	--------	--------	--------	308 (a)	--------
	Minimum	--------	--------	--------	294	--------
April	Maximum	1,846	--------	--------	632	452
	Mean	1,117	--------	--------	398	155
	Minimum	495	--------	--------	317	65
May	Maximum	2,462	2,910	--------	2,141	3,633
	Mean	1,545	1,610	--------	1.354	1,790
	Minimum	968	412	--------	426	364
June	Maximum	2,242	2.878	--------	3,900	3,633
	Mean	1,599	1,835	--------	2,639	2.083
	Minimum	1,244	1,170	--------	1,524	987
July	Maximum	1,626	1.453	--------	2.094	1.106
	Mean	1.159	995	--------	1,301	633
	Minimum	819	530	--------	494	392
August	Maximum	1,285	748	423	1,334	452
	Mean	800	532	280	497	320
	Minimum	708	416	169	294	236
September	Maximum	819	436	314	368	392
	Mean	537	414	199	281	291
	Minimum	429	384	169	240	236
October	Maximum	402	370	314	--------	284
	Mean	402	322	225	--------	192
	Minimum	402	320	100	--------	106

(a) March 1st to 21st no record.

COMPARATIVE TABLE OF DISCHARGE
OF THE ARKANSAS RIVER AT SALIDA, COLO.—(Concluded.)

Month	Stage of Water	1895	1897	1898	1899	1900
November	Maximum	--------	--------	314	--------	--------
	Mean	--------	--------	267	--------	--------
	Minimum	--------	--------	205	--------	--------
December	Maximum	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------

CANON CITY STATION ON ARKANSAS RIVER.

This station is located at the Hot Springs hotel, one and one-half miles west of Canon City, a short distance below the mouth of Grape creek. It was established in 1889, and the records have been kept up ever since that time, thus furnishing a most valuable table of the discharge of the Arkansas river. The station is particularly important, as it is located at the mouth of the canon and at a point practically above all irrigating ditches, excepting the Canon City ditch, which has sometimes been called the North Side ditch and the South Canon ditch, which head above the station. Each of these ditches carries from twenty-five to sixty cubic feet per second during the irrigating season, and their discharge should be added to that shown by the gauge rod at the station in order to get the total runoff at the mouth of the canon.

The gauge rod is an inclined timber fastened to the north end of the suspension foot bridge belonging to the Hot Springs hotel. The channel is straight for a long distance and consists of boulders which do not readily change, thus furnishing an opportunity to obtain fairly accurate results.

The observer at this point is Dr. J. L. Prentiss, manager of the Hot Springs hotel.

LIST OF DISCHARGE MEASUREMENTS

OF CANON CITY AND SOUTH CANON DITCHES AT CANON CITY, COLO.

Date	DISCHARGE	
	Canon City Ditch	South Canon Ditch
April 27, 1899	55	48
Aug. 18, 1899	35	43
Nov. 7, 1899	28	36
Mar. 14, 1900	8	21
June 14, 1900	68	50
July 20, 1900	56	51
Sept. 8, 1900	58	31

LIST OF DISCHARGE MEASUREMENTS

MADE ON THE ARKANSAS RIVER AT CANON CITY, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
48	April 27	A. L. Fellows	88	3.20	145	4.21	611
49	May 26	A. L. Fellows	88	4.55	300	7.30	2,189
50	July 7	A. L. Fellows	88	4.50	325	8.16	2,651
51	Aug. 18	A. L. Fellows	88	2.90	139	3.99	553
52	Nov. 7	A. L. Fellows	133	2.55	105	2.91	306
	1900						
53	Mar. 14	A. L. Fellows	90	2.85	121	3.37	408
54	June 14	A. L. Fellows	71	5.50	416	7.78	3,235
55	July 20	A. L. Fellows	71	2.85	150	3.80	570
56	Sept. 8	A. L. Fellows	71	2.10	102	2.24	229
57	Sept. 12	R. W. Hawley	33	2.10	------	------	205

COMPARATIVE TABLE OF DISCHARGE

OF THE ARKANSAS RIVER AT CANON CITY, COLO.

Month	Stage of Water	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
January	Maximum	--------	494	505	630	580	580	398	489	320	316	316	362
	Mean	300	310	431	496	507	413	344	454	240	270	316	345
	Minimum	--------	180	325	345	430	390	298	428	165	242	316	328
February	Maximum	--------	446	530	555	630	510	458	520	392	408	560	362
	Mean	300	363	474	480	537	420	361	438	292	350	328	353
	Minimum	--------	250	365	430	455	390	298	371	203	316	160	328
March	Maximum	--------	400	685	605	855	810	584	492	392	360	1,057	485
	Mean	300	320	586	527	555	505	471	472	305	338	584	439
	Minimum	--------	180	505	410	480	340	398	344	256	316	360	397
April	Maximum	438	980	1,600	715	800	1,080	1,774	864	502	560	1,057	1,190
	Mean	300	477	857	522	568	661	868	558	201	393	544	736
	Minimum	214	200	580	365	480	390	458	398	108	276	360	485
May	Maximum	1,910	3,270	3,370	2,250	3,210	4,400	2.404	2,778	3,305	1,682	3.057	4,521
	Mean	600	2,090	2,612	1,593	1,480	1,959	1.506	1,276	1,736	909	1,924	2,251
	Minimum	324	841	1,340	685	480	990	790	650	466	408	476	812
June	Maximum	2,010	3,260	4,230	4,750	4,750	4,400	2,588	2,496	3,452	3,245	4,432	4,520
	Mean	1,374	2,611	3,291	2.803	3,115	2,704	1,900	959	2,474	2,428	3,496	3,492
	Minimum	1,002	2,320	1,600	1,780	1,875	1,290	1,308	398	1,608	1,619	2,370	2,189

July	Maximum	1,150	2,132	2,810	3,050	2 810	2,315	2,224	1,988	1,794	2,711	3,432	2 078
	Mean	602	1,571	1,468	1,798	1,069	1,396	1,113	538	1,090	1,621	2,021	891
	Minimum	290	920	770	1 060	290	730	1,024	235	466	476	1,182	282
August	Maximum	2,620	1,425	1,925	1,130	1,715	810	2,143	2,876	1,140	869	2,369	362
	Mean	340	670	951	726	575	710	1.095	395	498	326	711	273
	Minimum	243	215	530	455	200	650	790	144	203	242	242	217
September	Maximum	258	450	715	530	810	810	942	520	320	213	316	229
	Mean	220	383	473	735	477	551	635	313	249	189	225	211
	Minimum	200	326	345	365	290	390	458	192	203	160	186	194
October	Maximum	258	470	825	605	--------	390	827	344	613	316	276	297
	Mean	223	862	624	511	(a) 450	297	505	285	415	228	236	241
	Minimum	190	307	530	410	--------	245	398	235	256	160	186	217
November	Maximum	397	478	530	605	--------	290	520	344	613	360	560	328
	Mean	299	610	498	527	(a) 450	256	499	267	488	302	440	266
	Minimum	243	345	430	505	--------	245	398	124	256	242	316	217
December	Maximum	438	565	605	--------	580	340	520	790	320	360	408	328
	Mean	335	670	476	561	425	269	444	490	288	342	336	298
	Minimum	274	475	345	--------	390	245	256	218	256	316	276	268

(a) Estimated.

NOTE—1899. January, February, March, October, November and December estimated from weekly averages. 1900, January, February and March estimated from weekly averages.

PUEBLO STATION ON ARKANSAS RIVER.

This station is located at Main street bridge in the city of Pueblo. Measurements have been kept up more or less regularly since September, 1894. The gauge rod was a 2x6-inch plank bolted to the masonry wall at the south end of the Main street bridge, until the spring of 1900, when, owing to the scouring of the channel, it became necessary to replace this gauge by another one sixty-nine feet below the south end of the Union avenue bridge. Discharge measurements, however, are still made at the Main street bridge. The channel is an excellent one at this point and it would be of very great advantage if a permanent station of concrete were to be made. The channel is confined by high masonry walls and is of boulders and gravel so that there is little change, except that it fills up in low and scours out in high water. The stream flows rapidly at this point, but not too fast for accurate measurements.

The gauge readings have been made the last two years by Mr. Burrows, water commissioner of the Pueblo water district. The station is an extremely important one in its relations to the entire Arkansas river, as it is located near the head of the principal irrigation portion of the valley, only one ditch of importance being taken out above it in the Pueblo district, although considerable water is used in the ditches in the neighborhood of Canon City, which is in another water district. It is upon the gaugings made at this point that the water superintendent and commissioners depend for distribution of water to the ditches below.

LIST OF DISCHARGE MEASUREMENTS

MADE ON THE ARKANSAS RIVER AT PUEBLO, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
10	April 27..	A. L. Fellows	88	.80	182	3.81	695
11	May 26..	A. L. Fellows......	88	2.20	392	5.66	2.221
12	June 3..	C. W. Beach.......	90	2.55	477	5.99	2,856
13	June 17..	C. W. Beach.......	90	3.60	655	6.97	4,565
14	July 1..	C. W. Beach.......	90	2.22	463	6.34	2,959
15	July 8..	A. L. Fellows......	88	1.61	375	5.59	2,098
16	Aug. 1..	C. W. Beach.......	90	.72	236	5.08	1,199
17	Aug. 5..	C. W. Beach.......	90	1.46	358	5.39	1,938
18	Aug. 14..	A. L. Fellows......	133	1.20	318	4.70	1.496
19	Sept. 10..	A. L. Fellows......	133	—.50	70	2.57	180
20	Sept. 18..	C. W. Beach.......	90	—.10	106	3.65	388
21	Oct. 6..	C. W. Beach.......	90	—.20	95	3.70	331
22	Nov. 7..	A. L. Fellows.....	133	.05	117	3.51	411
	1900 (a)						
23	Mar. 3..	A. L. Fellows......	90	2.17	131	3.80	498
24	Mar. 16..	A. L. Fellows......	90	2.05	111	3.92	435
25	Apr. 8..	A. L. Fellows......	71	2.34	162	4.17	675
26	Apr. 12..	C. W. Beach.......	90	2.15	149	4.07	608
27	May 21..	C. W. Beach.......	90	5.70	663	7.65	5,072
28	June 13..	A. L. Fellows......	71	5.10	588	6.74	3,963
29	July 17..	A. L. Fellows......	71	2.50	186	4.04	751
30	July 31..	A. L. Fellows......	71	2.25	158	3.69	583
31	Sept. 3..	R. W. Hawley.....	33	1.35	66	2.32	153
32	Sept. 5..	C. W. Beach.......	90	1.43	66	2.87	191
33	Sept. 7..	A. L. Fellows......	71	1.40	69	2.52	174
34	Sept 25..	C. W. Beach... ...	90	1.82	104	3.34	346

(a) New gage rod.

COMPARATIVE TABLE OF DISCHARGE

OF THE ARKANSAS RIVER AT PUEBLO, COLO.

Month	Stage of Water	1895	1896	1897	1898	1899	1900
January	Maximum	740	601	436	425	512	566
	Mean	460	519	323	330	408	411
	Minimum	327	383	230	178	300	334
February	Maximum	670	536	402	470	1,060	566
	Mean	476	456	327	385	607	418
	Minimum	327	354	202	232	343	218
March	Maximum	412	472	364	425	652	538
	Mean	357	395	212	320	405	391
	Minimum	301	301	146	232	221	263
April	Maximum	1,790	1,172	616	620	784	2,910
	Mean	744	470	235	370	418	822
	Minimum	301	276	146	232	232	218
May	Maximum	2,490	2,352	3,470	1,258	2,855	6,703
	Mean	1,561	1,097	1,631	841	1,682	2,997
	Minimum	601	472	578	470	448	1,357
June	Maximum	3,564	2,096	3,750	3,290	4,891	6,980
	Mean	2,152	895	2,214	2,202	3,384	4,006
	Minimum	1,455	412	1,218	1,258	1,633	1,788

July	Maximum	5,000	2,835	1,848	5,385	3,122	1,686
	Mean	1,900	633	1,036	1,605	2,043	878
	Minimum	1,044	301	474	470	1,162	334
August	Maximum	3,112	3,438	1,170	948	2,492	511
	Mean	1,275	489	470	306	811	314
	Minimum	568	203	180	123	196	174
September	Maximum	888	441	436	266	378	310
	Mean	494	309	272	125	239	232
	Minimum	383	219	146	46	150	134
October	Maximum	705	340	544	425	430	412
	Mean	551	293	414	210	304	321
	Minimum	412	268	230	31	231	218
November	Maximum	601	486	578	402	469	511
	Mean	530	314	484	309	374	338
	Minimum	472	235	364	232	286	382
December	Maximum	568	420	436	470	444	407
	Mean	462	333	357	364	331	396
	Minimum	327	268	230	178	250	358

NOTE—1899, August to December, inclusive. No record on Sundays and holidays.

NEPESTA STATION ON ARKANSAS RIVER.

This station is located at the wagon bridge a short distance above the town of Nepesta, and is maintained by the Great Plains Water Company. It was established September 8, 1897, and has been kept up during the irrigation seasons of 1898, 1899 and 1900. The gauge consists of a vertical timber securely fastened to the up-stream cylinder of the bridge, on the left side of the river, readings being made at low water by a small temporary gauge on the right hand. The channel is straight, but the bed is sandy and shifting and gauge readings are unreliable on that account.

The observer is Mr. J. A. Braun, railway station agent at Nepesta.

LIST OF DISCHARGE MEASUREMENTS

MADE ON THE ARKANSAS RIVER AT NEPESTA, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
10	May 29..	A. L. Fellows	90	4.60	409	4.42	1,810
11	June 7..	C. W. Beach.......	90	4.63	368	4.45	1,636
12	Aug. 3..	C. W. Beach.......	90	4	194	3.14	610
13	Aug. 25..	C. W. Beach	90	3.10	105	2.04	215
14	Oct. 2..	C. W. Beach.......	90	3.12	86	2.50	213
	1900						
15	April 12..	C. W. Beach.......	90	4.30	277	3.69	1,101
16	Sept. 8..	R. W. Hawley.....	33	3.70	93	1.57	146

COMPARATIVE TABLE OF DISCHARGE
OF THE ARKANSAS RIVER AT NEPESTA, COLO.

Month	Stage of Water	1897	1898	1899	1900
April	Maximum	--------	504	314 (a)	--------
	Mean	--------	414	272	--------
	Minimum	--------	350	191	--------
May	Maximum	--------	4,010	2,246	9,600
	Mean	--------	1,122	1,154	5,876
	Minimum	--------	350	259	4,246
June	Maximum	--------	3,665	3,882	7,782
	Mean	--------	2,005	2,622	5,498
	Minimum	--------	918	1,156	4,064
July	Maximum	--------	4,125	6,064	3,700
	Mean	--------	1,309	2,651	1,699
	Minimum	--------	130	610	427
August	Maximum	--------	697	6,974	1,519
	Mean	--------	311	957	422
	Minimum	--------	115	172	172
September	Maximum	201	294	285	427
	Mean	168	232	200	262
	Minimum	134	160	154	172
October	Maximum	268	511	314	610
	Mean	198	279	235	435
	Minimum	84	160	172	314
November	Maximum	--------	511	2,791	792
	Mean	--------	366	350	514
	Minimum	--------	260	191	259

(a) April, 1899, record begins on the 21st.

ROCKY FORD STATION ON THE ARKANSAS RIVER.

This station is located about two miles northeast of Rocky Ford, at a wagon bridge crossing the river, and was established May 3, 1897, by Mr. S. W. Cressy, water commissioner of that district. Mr. Cressy kept up voluntary observations as long as he remained in charge of the office, since which time reports from that district have ceased, the last one having been sent in April 7, 1900. The river is comparatively straight for some distance above and below the bridge, but the bed is very sandy and shifting and changes radically at different stages of the water, so that the results as obtained from any single rating table must be considered as merely approximate.

LIST OF DISCHARGE MEASUREMENTS

MADE ON THE ARKANSAS RIVER AT ROCKY FORD, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
4	May 30 --	A. L. Fellows ----	90	1.88	445	2.34	1,042
5	October 16	A. L. Fellows ----	133	.88	79	1.74	136

COMPARATIVE TABLE OF DISCHARGE

OF THE ARKANSAS RIVER AT ROCKY FORD, COLO.

Year	Stage of Water	MONTH											
		January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.
1897	Maximum	--------	--------	--------	--------	2.90	2.82	2.05	2.05	.70	1.00	1.10	--------
	Mean	--------	--------	--------	--------	1.47	1.92	1.04	1.01	.35	.65	.62	--------
	Minimum	--------	--------	--------	--------	.50	1.17	.35	.20	.15	.25	.35	--------
1898	Maximum	--------	193	393	550	3,832	3,363	3,754	706	393	550	862	393
	Mean	--------	76	253	210	1,206	2,054	1,244	271	157	236	530	229
	Minimum	--------	34	129	64	108	315	193	108	64	84	84	84
1899 (a)	Maximum	--------	--------	550	510	1,250	2,150	3,020	3,570	420	360	1,070	190
	Mean	--------	--------	308	279	731	1,499	1,502	685	153	144	277	147
	Minimum	--------	--------	140	140	137	790	290	105	95	55	105	115
1900 (b)	Maximum	470	470	450	3.120	--------	--------	--------	--------	--------	--------	--------	--------
	Mean	310	410	324	1,283	--------	--------	--------	--------	--------	--------	--------	--------
	Minimum	190	270	190	360	--------	--------	--------	--------	--------	--------	--------	--------

(a) 1899, record begins March 13 and ends December 9

(b) 1900, January 1 to 15, February 10 to 24, April 8 to 30, no record.

NOTE—The gage heights in feet are given for 1897, there being no rating at that time.

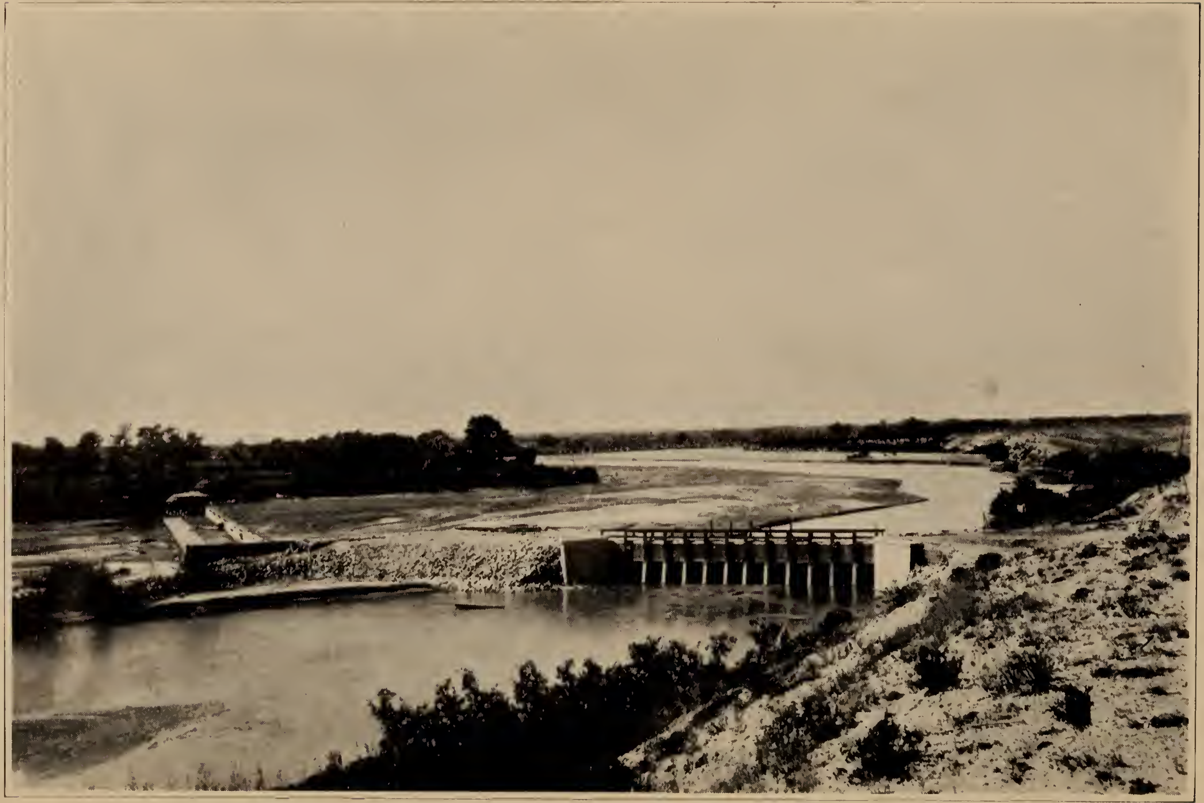
STATION AT HEAD OF FORT LYONS CANAL ON ARKANSAS RIVER.

This station was established September 12, 1897, for the purpose of determining the discharge over the dam at the head of the Fort Lyons canal, and further to obtain data concerning the construction of rating curves of dams similar to this. The station was maintained by the Great Plains Water Company. The station has, however, not been kept up regularly, and will not be continued. The abandonment of work at this point was due principally to the fact that great bars of sand formed at various points above the dam, affecting the relationship between the gauge height and discharge so that the construction of a satisfactory rating table proved impracticable. But three measurements were made at this point, all being in the year 1899; the first on May 30, at a gauge height of 0.05 feet, giving a discharge of 246 second feet; the second on June 13, with a gauge height of 0.47 feet, showed a discharge of 857 second feet, and the last measurement on June 20, with a gauge height of 0.67 feet, gave a discharge of 1,181 second feet.

COLORADO AND KANSAS CANAL STATION ON ARKANSAS RIVER.

This station was established in September, 1899, but no observations were made and no reports sent in until the spring of 1900. It is located at the dam constructed across the river at the head of the Colorado and Kansas canal, which point was selected in the hope that the channel might prove unchanging at this point. Up to the present time results have justified this supposition, as the rating curve obtained has given excellent results within the limits of the measurements. The station is of particular importance, as it is practically at the head of irrigation district No. 67, only the Colorado and Kansas canal and the Peterson ditch being taken out above in this district.

The observer is D. L. Birge, headgate keeper of the Colorado and Kansas canal.



HEAD OF FORT LYONS CANAL, ON ARKANSAS RIVER.

LIST OF DISCHARGE MEASUREMENTS

MADE ON THE ARKANSAS RIVER AT COLORADO AND KANSAS CANAL DAM.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	Sept. 8	A. L. Fellows	133	.20	16	1.01	16
	1900						
2	July 5	C. W. Beach	90	.60	130	2.35	304
3	July 19	A. L. Fellows	71	.38	49	2.31	113
4	July 28	C. W. Beach	90	.77½	420	1.44	546

TABLE OF DISCHARGE

OF THE ARKANSAS RIVER AT COLORADO AND KANSAS CANAL DAM.

Year	Stage of Water	MONTH					
		April	May	June	July	August	Sept. (a)
	Maximum	7,140	5,860	4,900	1,700	445	30
1900	Mean	2,940	3,398	2,617	161	45	6
	Minimum	1,060	2 660	742	2	---- ---	--------

(a) September 1st to 22d, inclusive.

[illegible]

AMITY CANAL STATION ON ARKANSAS RIVER.

This station is located at the head of Amity canal, seven miles west of Lamar, and is maintained by the Amity Canal Company, which keeps the records of the amount of water flowing into the ditch over the dam, and out of the waste-way of the canal.

The measurements as given below are those furnished by Mr. E. R. Bannister, headgate keeper of the Amity canal.

Records were also kept for a short time in 1899 at the bridge crossing the river north of Lamar, the discharge being furnished by Mr. J. B. Traxler, water commissioner of district No. 67. The channel is sandy and shifting and gauge heights at this point would be of little value unless frequent measurements could be made. One discharge measurement was made at this point in 1900 by A. L. Fellows, upon April 7, giving 8,890 second feet.

COMPARATIVE TABLE OF DISCHARGE

OF THE ARKANSAS RIVER AT AMITY CANAL HEADGATES.

Month	Stage of Water	1898	1899	1900
January	Maximum			
	Mean			239
	Minimum			
February	Maximum			
	Mean			280
	Minimum			
March	Maximum			
	Mean			170
	Minimum			
April	Maximum			
	Mean			2,973
	Minimum			
May	Maximum			
	Mean			4,469
	Minimum			
June	Maximum		1,592	
	Mean		655	3,290
	Minimum		179	

COMPARATIVE TABLE OF DISCHARGE.

OF THE ARKANSAS RIVER AT AMITY CANAL HEADGATES—Concluded.

Month	Stage of Water	1898	1899	1900
July	Maximum	------------	6,741	------------
	Mean	------------	1,870	280
	Minimum	------------	211	------------
August	Maximum	685	6,135	------------
	Mean	211	884	89
	Minimum	56	25	------------
September	Maximum	56	225	------------
	Mean	23	74	22
	Minimum	6	7	------------
October	Maximum	165	152	------------
	Mean	54	87	20
	Minimum	6	48	------------
November	Maximum	610	905	------------
	Mean	265	249	109
	Minimum	77	94	------------
December	Maximum	------------	177	------------
	Mean	------------	131	------------
	Minimum	------------	103	------------

1899, record closes December 12.

ESTIMATED DAILY DISCHARGE OF ARKANSAS RIVER AT LAMAR.

By J. B. Traxler, Water Commissioner District No. 7.

Day	March	April	May
	Discharge	Discharge	Discharge
1	3,000	40	12
2	4,000	40	12
3	4,000	35	12
4	2,500	35	12
5	2,000	30	12
6	1,500	25	12
7	1,200	25	12
8	1,000	25	12
9	800	20	12
10	800	15	12
11	1,500	16	12
12	1,500	16	12
13	1,200	15	12
14	1,000	18	14
15	1,000	20	15½
16	1,000	15	5
17	1,000	15	5
18	800	15	5
19	400	15	5
20	300	15	5
21	300	15	
22	200	15	
23	150	15	
24	100	15	
25	75	15	
26	50	15	
27	40	12	
28	35	12	
29	35	12	
30	35	12	
31	40		

Total amount of water in district March 13th, 250 second feet; April 3d, 225 second feet; April 16th, 175 second feet; April 25th, 120 second feet; April 30th, 75 second feet; May 5th, 180 second feet; May 10th, 100 second feet; May 13th, 200 second feet; May 14th, 150 second feet; May 16th, 230 second feet; May 18th, 325 second feet; May 20th, 308 second feet.

BUFFALO CREEK CANAL STATION ON ARKANSAS RIVER.

This station was established July 24, 1898, being located at the headgates of the Buffalo Creek canal, two miles northeast of Granada. There is an earth and brush dam across the river at this point, but owing to the unstable nature of the dam the gauge heights are of little value, as they give merely an idea of the rise and fall of the river, without particular reference to the actual discharge. Readings have been made ever since the establishment of the station throughout the irrigation seasons of 1898, 1899 and 1900, the observations being made by Mr. Ben Riley, headgate keeper of the Buffalo canal.

COMPARATIVE TABLE OF GAGE HEIGHTS.

ARKANSAS RIVER AT BUFFALO CREEK, COLO.

Year	Stage of Stream	MONTH											
		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1899	Maximum	1.80	2.40	2.40	.80	1.20	3	5	5.40	1	.80	3	3.60
	Mean	1.12	1.82	1.20	.48	.71	1.17	2.07	1.25	.72	.80	1.01	2.08
	Minimum	1.40	1.40	.30	.20	.40	.40	.60	.60	.60	.80	.80	.80
1900	Maximum	3.60	3.60	2.00	3.80	4.80	4.60	3.60	1.80	1.80	1.80	2	--------
	Mean	2.90	2.58	1.47	2.71	3.58	3.03	2.53	1.49	1.53	1.54	1.84	--------
	Minimum	1.80	2	.80	1	2.80	1.80	1.70	.80	1.20	1	1.80	--------

TRINIDAD STATION ON PURGATOIRE RIVER.

The Purgatoire river is one of the principal tributaries entering the Arkansas river from the south. Its head waters have their rise in northern New Mexico and southern Colorado, and the stream flows in a generally northeasterly direction across the plains, entering the main stream a short distance below Las Animas. The station itself is located at the Las Animas street bridge in the city of Trinidad, and was maintained from May 1, 1896, to July 31, 1899, when measurements were discontinued owing to the changeable nature of the channel, which consists at this point of moving gravel bars, and can not be relied upon as permanent. The greater portion of the water of this stream is taken out above Trinidad during the irrigation season, so there is usually a very small amount at the station during the summer. If another station could be established at a point higher up on the stream, probably about nine miles above Trinidad, it would be of greater value than that at the town itself. The observations were made until the station was discontinued, July 31, 1899, by Mr. J. N. Turner of Trinidad.

LIST OF DISCHARGE MEASUREMENTS

MADE ON PURGATOIRE RIVER AT TRINIDAD, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
17	April 28..	A. L. Fellows....	88	3.60	39	1.34	52
18	July 12..	A. L. Fellows.....	88	3.30	2	2.39	4

COMPARATIVE TABLE OF DISCHARGE
OF THE PURGATOIRE RIVER AT TRINIDAD, COLO.

Year	Stage of Water	MONTH							
		April	May	June	July	August	September	October	November
1897	Maximum	327	1,412	1,534	1,657	2,026	386	104	54
	Mean	165	732	402	250	258	97	60	42
	Minimum	68	327	189	30	5	30	54	30
1898	Maximum	------------	882	1,282	1,147	752	1,282	58	42
	Mean	------------	266	377	259	181	173	39	42
	Minimum	------------	109	109	81	42	42	31	37
1899	Maximum	193	230	492	2,362	------------	------------	------------	------------
	Mean	82	110	71	443	------------	------------	------------	------------
	Minimum	32	52	4	16	------------	------------	------------	------------

"J. J." RANCH ON PURGATOIRE RIVER.

An effort was made in 1898 by the Great Plains Water Company to establish a gauging station at the "J. J." ranch, about twenty-two miles south of the town of La Junta, on Purgatoire river. A few measurements were made and records were kept up for a short time, but owing to the changeable nature of the channel and the impracticability of holding a gauge rod at this point, the measurements were discontinued. A station at this point would be valuable principally from the fact that the "J. J." ranch has telephone connection with the town of La Junta, and floods on the Purgatoire river could be announced along the Arkansas river. Such information would be of great value to the owners of irrigation canals heading below the mouth of that stream.

RIO GRANDE IRRIGATION DIVISION.

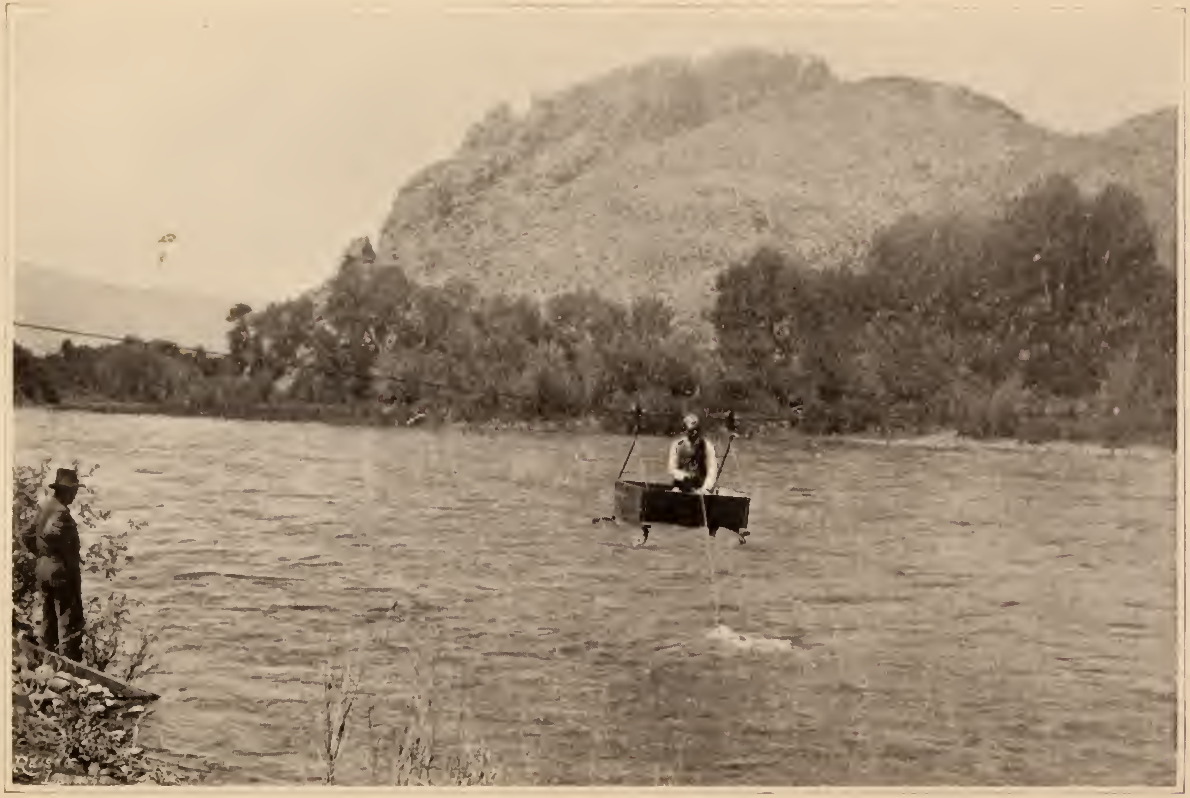
The Rio Grande and its tributaries drain the mountainous area south and east of the continental divide in Southwestern Colorado, the principal streams flowing from the east side of the Needle mountains and from the south and east side of the San Juan range. Important streams also flow from La Garita mountains in Saguache and Mineral counties. The main stream flows in an easterly direction for about seventy-five miles, receiving numerous tributaries from the mountainous region through which it flows. At the town of Del Norte the valley widens into what is known as the San Luis valley; thence the stream flows in a southeasterly and southerly direction for about the same distance to a point about twenty miles southeast of Antonito, where it crosses the state line. From the time the river leaves Del Norte but few streams of importance flow into it, as nearly all of those that issue from the mountains lose their waters in the plains before they reach the main stream. This is particularly true of the drainage north and east of the river from the Cochetopa hills and the Sangre de Cristo range, although the streams flowing from these mountains are very numerous and carry large volumes of water, yet they furnish no visible supply to the Rio Grande itself, all the water being lost either in the sands or in the lakes until Trinchera creek, flowing through the Costilla land grant, is reached. This stream, which is usually dry, still furnishes a supply at different times in the year. On the south and west side of the river, however, many important streams flow from the mountains which in their higher stages carry large volumes of water to the Rio Grande.

Among these are the Alamosa, the La Jara, the Conejos and others of lesser importance. The supply from these streams also is mostly used during the summer time, so that after the flood stage is passed little flows from any of these sources into the Rio Grande. A similar condition of affairs exists in the Rio Grande itself, as most of the water is used in the upper part of the valley, and in the late summer very little passes Alamosa, below which place there are but very few irrigating canals. During the flood stages, however, great volumes of water flow from the Rio Grande itself and several of its tributaries, which might be stored and used for the extension of the irrigated area. Unfortunately, owing to the international complications, it has been impossible to store water in the past, but should these complications be removed a number of reservoir sites in the valley will undoubtedly be made use of at once, as the water is greatly needed for irrigation.

Farming is carried on quite extensively along the upper valleys of several of the streams issuing from the mountains north and east of San Luis valley, but no measurements have been made upon any of these streams. The effect of irrigation in its relation to seepage is an interesting problem in this valley. Professor L. G. Carpenter of Fort Collins, previously mentioned, has been making a study of the results along this line. But three stations have been maintained in the San Luis valley—two, at Del Norte and at the state line, being upon the main Rio Grande, and one upon the Conejos, about ten miles west of Antonito.

DEL NORTE STATION ON THE RIO GRANDE RIVER.

This station is located about three miles west of the town of Del Norte, at a point above the main canals taking water from the Rio Grande. Records have been kept up at this station since the fall of the year 1889 for practically the entire time. The gauge rod is an inclined timber on the right bank of the stream. Gaugings are made by means of a box which travels across the river along a steel cable, the distance being marked on a tag wire. The channel is one of the best in the state, the water, although flowing rapidly, seldom scouring, and the bed therefore remaining practically the same from year to year. The bed of the channel is covered with small boulders, and the sides, although not high, have never been known to overflow at this point. The observer is J. S. Regan, who has kept the records regularly ever since the station was established.



GAGING RIO GRANDE AT DEL NORTE, AT HIGH WATER.

LIST OF DISCHARGE MEASUREMENTS

MADE ON RIO GRANDE RIVER AT DEL NORTE, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
54	April 25.	A. L. Fellows....	88	2.42	247	4.07	1,004
55	May 24..	A. L. Fellows....	88	2.92	298	4.97	1,480
56	June 29..	A. L. Fellows....	88	2.10	197	3.73	734
57	Aug. 21..	A. L. Fellows....	88	1.58	139	2.78	387
	1900						
58	Mar. 30..	A. L. Fellows....	71	1.54	129	2.68	346
59	May 12..	A. L. Fellows....	71	3.84	432	5.65	2,441
60	June 16..	A. L. Fellows....	71	3.66	431	5.55	2,382
61	Aug. 18..	A. L. Fellows....	138	1.34	105	2.10	221

COMPARATIVE TABLE OF DISCHARGE

OF THE RIO GRANDE RIVER AT DEL NORTE, COLO.

Month	Stage of Water	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899 (b)	1900 (c)	01	02
January	Maximum	1,000	1,320	000	1.113	1,113	894	1,428	1,150	1,442	1,392	1,185	928	437
	Mean	552	990	00 300	964	1,005	801	1,293	981	1,377	1,308	862	870	381
	Minimum	337	670	900	862	896	680	1,172	548	1,249	1,235	719	796	336
February	Maximum	896	1,410	1000	1100	1,037	1,061	2,154	1 268	1,556	1,198	1,132	995	450
	Mean	796	1,294	300 300	900 800 (a)	992	953	1,258	1,233	1,472	1,113	1,005	920	412
	Minimum	745	1,193	600	700	930	894	960	1,190	1,333	1,039	797	845	385
March	Maximum	842	1,460	00	1200	1,113	960	1,336	1,444	1,897	1,371	546	878	437
	Mean	487	1,280	800 316	900 600(a)	840	638	1 081	953	1,470	875	399	710	438
	Minimum	353	930	600	700	404	403	830	650	1,168	431	333	560	189
April	Maximum	1,812	3,160	2,400	1,037	1,510	3,129	3,054	2,126	3,406	1,039	532	1664	1027
	Mean	913	1,410	1,047	533	655	1,883	1,484	1,064	1,912	617	419	670	638
	Minimum	404	796	345	326	404	650	594	604	890	280	333	295	265
May	Maximum	5,930	5,650	4,710	3,320	2,550	3,129	3,579	5,234	4,382	2,340	5,454	4494	1781
	Mean	4,331	3,285	2,605	1,944	1,708	2,116	2,374	3,545	2,722	1,378	2,854	2568	1167
	Minimum	1,990	1.860	1,510	732	1,704	1,382	1,212	1,645	2,152	551	560	1483	660
June	Maximum	5,555	5,555	3,160	2,850	1,410	3,804	1,766	4,860	5,266	1,498	5,394	2752	201
	Mean	3,807	4,146	2,187	1,749	802	2,209	821	3,398	4,390	1,091	2,691	1587	618
	Minimum	2,550	2,190	1,152	670	345	1,172	430	1,675	2,824	753	1,012	1167	210

July	Maximum	2,260	3,565	1,074	640	370	1,252	650	2,276	2,664	1,292	995	1063	159
	Mean	1,515	1,693	740	395	292	958	403	1,106	1,616	703	547	595	112
	Minimum	765	862	554	290	245	770	322	582	358	537	283	384	152
August	Maximum	895	1,460	610	450	430	960	403	604	614	1,198	320	660	63[illegible]
	Mean	612	663	444	324	309	720	261	477	509	598	231	4[illegible]	1[illegible]
	Minimum	450	404	308	274	245	566	214	354	384	292	163	[illegible]	69
September	Maximum	450	1,193	308	315	370	566	1,294	952	398	768	384	69[illegible]	34[illegible]
	Mean	383	527	262	273	286	454	477	632	319	365	256	44[illegible]	[illegible]
	Minimum	326	308	243	228	230	376	268	342	260	268	186	28[illegible]	1[illegible]
October	Maximum	862	2,475	290	308	350	484	566	2,246	614	606	384	30[illegible]	[illegible]12
	Mean	470	844	259	259	289	435	469	1,474	322	492	343	[illegible]	2[illegible]2
	Minimum	307	450	243	243	260	403	403	772	221	312	308	[illegible]	169
November	Maximum	478	450	[illegible]	450	260	403	376	868	1,442	708	320	3[illegible]	[illegible]
	Mean	401	374	360	279	236	353	310	666	741	490	253	272	[illegible]
	Minimum	345	308	[illegible]	214	200	322	268	536	221	405	198	[illegible]	[illegible]
December	Maximum	670	[illegible]	10[illegible]	862	434	1,212	430	1,255	1,376	907	961	[illegible]	[illegible]
	Mean	565	326	922	611	282	1,008	375	1,005	1,298	712	755	[illegible]	[illegible]
	Minimum	475	Jan.	Dec.	228	212	403	322	743	1,228	649	358	2[illegible]	[illegible]

(a) Estimated.
(b) 1899, January, February, March, October, November and December, estimated from weekly observations.
(c) 1900, January, February, March and December, estimated from weekly observations.

CENICERO STATION ON RIO GRANDE RIVER.

This station is located a short distance above the state line, at a point where the river is crossed by a state wagon bridge. Gaugings were begun at this point July 28, 1899, and records have been kept up regularly since that time. There are two gauge rods—one for high and the other for low water, the high water rod being a 2x6 timber attached to the west side of the central down stream cylinder of the bridge, and the other being marked on a large boulder about one hundred yards below the bridge. The channel is an excellent one in most respects, as the bed consists of boulders and of rock and is subject to but little change, and the banks are high and are not liable to overflow. Gaugings may be made at the bridge, but in low water they are usually made by wading.

Roman Mondragon, who keeps a store at the west end of the bridge, has been making the observations.

The station is an important one, giving, as it does, the discharge of the river at the state line, including practically all of the Colorado drainage.

LIST OF DISCHARGE MEASUREMENTS

MADE ON RIO GRANDE RIVER AT STATE LINE, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	June 28..	A. L. Fellows......	88	.90	--------	--------	20
2	Aug. 24..	A. L. Fellows......	88	1	.34	.90	31
3	Nov. 28..	A. L. Fellows......	133	1.80	2.82	1.05	297
	1900						
4	Mar 29..	A L. Fellows......	71	1.60	.74	3.19	236
5	May 10..	A. L. Fellows......	71	2	3.98	1.49	594
6	June 22..	A. L. Fellows......	71	1.80	3.68	1.14	420
7	Aug. 16..	A. L. Fellows......	138	.75	.10	1.76	18

COMPARATIVE TABLE OF DISCHARGE
OF RIO GRANDE RIVER AT STATE LINE, COLO.

Month	Stage of Water	1899	1900
January	Maximum	-----------	1,134
	Mean	-----------	638
	Minimum	-----------	594
February	Maximum	-----------	1.134
	Mean	-----------	759
	Minimum	-----------	22
March	Maximum	-----------	1,134
	Mean	-----------	583
	Minimum	-----------	236
April	Maximum	-----------	504
	Mean	-----------	350
	Minimum	-----------	183
May	Maximum	-----------	3,294
	Mean	-----------	1.430
	Minimum	-----------	414
June	Maximum	20	3.294
	Mean	17 (a)	1,424
	Minimum	12	79
July	Maximum	170	58
	Mean	42	29
	Minimum	12	22
August	Maximum	129	22
	Mean	53	22
	Minimum	20	16
September	Maximum	426	43
	Mean	102	31
	Minimum	31	16
October	Maximum	170	58
	Mean	117	37
	Minimum	65	31

(a) Record begins June 28th, 1899.

COMPARATIVE TABLE OF DISCHARGE
OF RIO GRANDE RIVER AT STATE LINE, COLO.—Concluded.

Month	Stage of Water	1899	1900
November	Maximum	297	504
	Mean	259	155
	Minimum	170	58
December	Maximum	384	594
	Mean	320	571
	Minimum	170	414

LOS MOGOTES STATION ON CONEJOS RIVER.

This station is located about ten miles west of Antonito, from which town it is reached by driving, the nearest post-office being at Los Mogotes, which is, however, some miles distant from the station. The stream, which is the most important tributary of the Rio Grande, rises on the eastern slope of the San Juan range, which forms the western line of Conejos county. It flows southeasterly, and then bending at the town of Conejos in a generally northeasterly direction, enters the Rio Grande below the mouth of Trinchera creek.

The station was established August 25, 1899, and was first located at the wagon bridge crossing the river, but owing to the fact that the rod at that point was maliciously destroyed, the station was moved to a point about five hundred yards down stream, where it was attached to a pier projecting into the river, near a farm house. The channel is fairly good, being of gravel and not particularly liable to either change or overflow. Owing to the removal of the gauge no rating table was possible for 1899, and but few measurements were made in 1900 and few records kept, owing to the fact that the observer, Gustav Timm, moved away early in the season and no one was found to take his place.

LIST OF DISCHARGE MEASUREMENTS

MADE ON CONEJOS RIVER AT LOS MOGOTES, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	Aug. 25..	A. L. Fellows....	88	1	38	2.03	76
2	Nov. 28..	A. L. Fellows....	133	2.20	36	1.93	70
	1900						
3	Mar. 28..	A. L. Fellows....	71	1.68	46	3.13	144
4	May 11..	A. L. Fellows....	71	3.10	229	4.75	1,087
5	June 23..	A. L. Fellows....	71	2.30	178	2.62	467
6	Aug. 17..	A. L. Fellows ...	138	1.15	17	1.95	33

COMPARATIVE TABLE OF GAGE HEIGHTS.

CONEJOS RIVER AT LOS MOGOTES, COLO.

Year	Stage of Water	MONTH			
		March	September	October	November
1899...................	Maximum...........	....	2	1.38	2.20
	Mean...............	....	1.12	1.21	1.59
	Minimum...........	....	.87	1	1.10
1900...................	Maximum..........	671	....	....	....
	Mean...............	372	....	....	....
	Minimum...........	214	....	....	....

The discharge is given for March, 1900; no other record taken.

SAN JUAN IRRIGATION DIVISION.

The San Juan irrigation division consists of that portion of southwestern Colorado which is drained by the San Juan river and its tributaries. It differs essentially from the other irrigation divisions in that the main river does not flow continuously through the division and each irrigation district is practically a division in itself to the extent that the waters of the various streams are distributed for irrigation without reference to the water in the main stream and the other tributaries. This is due to the fact that the San Juan river leaves the state, crossing into New Mexico at a point below Arboles and runs through New Mexico for about one hundred miles, touching Colorado again only at the southwestern corner, of which it cuts off a very small fraction. The San Juan river rises in the San Juan mountains, the small streams at the head flowing westerly opposite to the direction taken by the branches of the Conejos. The country is generally mountainous and rough and but little irrigation is practiced, that little being along the borders of the stream.

The principal tributaries flowing from Colorado are the Piedra, Los Pinos, Florida, Las Animas, La Plata and the Mancos, all of which flow through comparatively narrow valleys, crossing the line into New Mexico before the San Juan itself is reached. A very large portion of this district has been but recently opened to settlement, as it remained a portion of the Southern Ute reservation until 1899, at which time the eastern half of this reservation was thrown open to settlement and many emigrants have come in. A very considerable portion of the most desirable lands had, however, been taken by the Indians in severalty. There are a number of very excellent benches of desirable land which will, undoubtedly, be eventually irrigated. A number of surveys have already been made of canal lines to cover these tracts which will be rapidly pushed to conclusion.

ARBOLES STATION ON SAN JUAN RIVER.

This station is located at the railway station of Arboles, on the Denver & Rio Grande railroad, the rod being located about one-fourth of a mile west from the depot, at a foot bridge constructed across the river at this point. The station was established June 19, 1895, and was maintained through a portion of each irrigation season until the fall of 1899, at which time this station, as well as the one at Piedra river, near by, was abandoned owing to the change in the time of trains, and to the fact that it was believed that sufficient measurements had been taken to get a fairly good idea of the normal flow of these streams. The channel was not favorable to accurate measurements, as the bridge crossed over a deep hole, which filled and scoured out at different stages of the water.

The observer for 1899 was Charles N. Painter, pumpman at the railway station.

LIST OF DISCHARGE MEASUREMENTS

MADE ON THE SAN JUAN RIVER AT ARBOLES, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
23	April 23..	A. L. Fellows....	88	7	319	4.03	1,286
24	May 22 .	A. L. Fellows....	88	6.60	251	2.93	737
25	June 26..	A. L. Fellows....	88	6.15	205	1.35	277
26	Nov. 26..	A. L. Fellows....	133	5.75	134	.94	127

COMPARATIVE TABLE OF DISCHARGE
OF THE SAN JUAN RIVER AT ARBOLES, COLO.

Mouth	Stage of Water	1895	1896	1897	1898	1899	1900
January	Maximum	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------
February	Maximum	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------
March	Maximum	--------	--------	--------	--------	--------	--------
	Mean	--------	--------	--------	--------	--------	--------
	Minimum	--------	--------	--------	--------	--------	--------
April	Maximum	--------	2,250	3,464	3,780	1.286	--------
	Mean	--------	1,123	1,937	1,538	934	--------
	Minimum	--------	689	478	241	1,569	--------
May	Maximum	--------	2,615	4,423	3,105	1,976	--------
	Mean	--------	1,635	3,393	1,884	918	--------
	Minimum	--------	689	2,431	1,157	373	--------
June	Maximum	1,770	1,298	3,759	3 255	805	--------
	Mean	1,261	444	2,311	2,385	550	--------
	Minimum	970	187	1,020	1,082	248	--------
July	Maximum	1,426	444	1,324	2,579	1,838	--------
	Mean	646	256	685	1,012	523	--------
	Minimum	388	198	340	319	152	--------
August	Maximum	777	584	404	408	1,700	--------
	Mean	422	189	303	255	385	--------
	Minimum	254	136	182	124	116	--------
September	Maximum	295	1,032	1,998	216	1,838	--------
	Mean	219	309	607	123	219	--------
	Minimum	174	177	182	83	96	--------
October	Maximum	339	484	2,210	216	--------	--------
	Mean	206	250	1,018	99	--------	--------
	Minimum	174	209	478	83	--------	--------

COMPARATIVE TABLE OF DISCHARGE

OF THE SAN JUAN RIVER AT ARBOLES, COLO.—Concluded.

Month	Stage of Water	1895	1896	1897	1898	1899	1900
November....	Maximum.... ..	274	244	534	83	--------	--------
	Mean...........	197	210	396	83	--------	--------
	Minimum......	135	157	300	83	--------	--------
December....	Maximum......	274	--------	--------	--------	--------	--------
	Mean...........	240	--------	--------	--------	--------	--------
	Minimum	214	--------	--------	--------	--------	--------

1899 record begins April 23d.

ARBOLES STATION ON PIEDRA RIVER.

This tributary of the San Juan river rises in Hinsdale and Mineral counties, flowing southwesterly through the San Juan mountains for about twenty miles; thence southerly to its junction with the San Juan at Arboles. The country is very rough and very little land is irrigated from this stream at the present time, excepting that lying immediately along its borders. The station is located at the railroad bridge about one-half mile west of the depot at Arboles, a short distance above the junction with the San Juan. This was established June 19, 1895, and has been maintained through a portion of each irrigation season since that time up to the fall of 1899. No measurements were made and no records kept in 1900 for the same reasons that influenced the abandoning of the station on the San Juan. The channel was somewhat rocky, being of boulders and gravel, and until 1899 did not change materially, but since that time there have been very radical changes, so that a rating curve made at the present time would bear no apparent relationship to that of two or three years ago.

The observer at this point is Mr. C. N. Painter, who kept the records of the San Juan also.

LIST OF DISCHARGE MEASUREMENTS

MADE ON THE PIEDRA RIVER AT ARBOLES, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Meter Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
23	April 23..	A. L. Fellows....	88	3.80	159	3.14	499
24	May 22..	A. L. Fellows....	88	3.40	118	2.36	279
25	June 26..	A. L. Fellows....	88	2.90	77	1.45	111
26	Nov. 26..	A. L. Fellows....	133	2.80	63	1.40	88

COMPARATIVE TABLE OF DISCHARGE OF THE PIEDRA RIVER AT ARBOLES, COLO.

Month	Stage of Water	1895	1896	1897	1898	1899	1900
April	Maximum	--------	1,660	2,190	1,599	467	--------
	Mean	--------	804	1,460	978	(a) 380	--------
	Minimum	--------	354	344	361	256	--------
May	Maximum	--------	2,066	2,398	1,564	643	--------
	Mean	--------	1,048	2,025	966	315	--------
	Minimum	--------	416	1,703	614	138	--------
June	Maximum	602	677	2.051	1,564	256	--------
	Mean	440	229	1,189	1,211	168	--------
	Minimum	303	79	487	614	88	--------
July	Maximum	670	190	586	1,390	439	--------
	Mean	346	111	296	585	141	--------
	Minimum	216	66	152	229	60	--------
August	Maximum	342	266	168	247	870	--------
	Mean	200	59	105	149	180	--------
	Minimum	141	23	65	106	38	--------
September	Maximum	185	3,000	799	165	138	--------
	Mean	115	347	399	89	49	--------
	Minimum	74	66	65	52	25	--------
October	Maximum	185	235	1,772	165	--------	--------
	Mean	125	175	840	71	--------	--------
	Minimum	87	119	364	52	--------	--------
November	Maximum	156	176	364	52	--------	--------
	Mean	93	121	235	37	--------	--------
	Minimum	60	92	183	27	--------	--------
December	Maximum	128	--------	--------	--------	--------	--------
	Mean	118	--------	--------	--------	--------	--------
	Minimum	114	--------	--------	--------	--------	--------

(a) 1899 record begins April 23.

IGNACIO STATION ON LOS PINOS RIVER.

This stream derives its supply from the western end of the San Juan range and from the southern slope of the Needle mountains. It flows in a southerly direction for about fifty miles, crossing the Colorado line about five miles south of La Boca, on the Denver & Rio Grande railroad. The valley is generally wider than the valleys of the Piedra and San Juan, and more irrigation is practiced along the borders of the stream. Several government canals have been constructed for the benefit of the Indians located upon the bottom lands. A number of irrigation canals have been projected and surveys made for the purpose of taking out water upon the adjacent benches.

The station was established April 22, 1899, at the request of the Indian bureau, for the purpose of ascertaining how much water was available for irrigation along the stream. Unfortunately reports have not been sent in as regularly as could be desired. The gauge rod is fastened to the middle pier of the bridge crossing the river at Ignacio, the subagency of the Southern Ute reservation, two miles south of the station of the Denver & Rio Grande railroad. The channel is fairly stable at this point, being of gravel and boulders, and has suffered little change since the station was established.

The observer is the clerk at the agency. The station is an important one, as all the waters of this stream will, undoubtedly, be used for irrigation before many years have passed. Already large reservoirs are contemplated near the head of the stream, where a number of beautiful lakes exist.

LIST OF DISCHARGE MEASUREMENTS

MADE ON LOS PINOS RIVER AT IGNACIO, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	April 22	A. L. Fellows	88	3.20	146	3	437
2	May 20	A. L. Fellows	88	3.40	163	3.54	577
3	June 25	A. L. Fellows	88	2.80	122	2	244
4	Nov. 25	A. L. Fellows	133	2.60	100	1.24	124
	1900						
5	Mar. 26	A. L. Fellows	71	2.60	106	1.29	137
6	May 8	A. L. Fellows	71	3.50	159	3.80	604
7	Aug. 14	A. L. Fellows	138	2	71	.35	25

COMPARATIVE TABLE OF DISCHARGE.

LOS PINOS RIVER AT IGNACIO, COLO.

Month	Stage of Water	1899 (a)	1900
January	Maximum	----------	101
	Mean	----------	82
	Minimum	----------	61
February	Maximum	----------	61
	Mean	----------	61
	Minimum	----------	61
March	Maximum	----------	141
	Mean	----------	94
	Minimum	----------	61
April	Maximum	634	193 (b)
	Mean	499	166
	Minimum	292	101
May	Maximum	947	1,326 (c)
	Mean	530	998
	Minimum	180	785
June	Maximum	605	----------
	Mean	469	----------
	Minimum	264	----------
July	Maximum	662	----------
	Mean	289	----------
	Minimum	124	----------
August	Maximum	1,346	----------
	Mean	349	----------
	Minimum	49	----------
September	Maximum	264	----------
	Mean	62	----------
	Minimum	36	----------
October	Maximum	292	----------
	Mean	127	----------
	Minimum	36	----------

(a) 1899, record begins April 23 and ends December 21.
(b) Record from 1st to 7th, inclusive.
(c) Record from 9th to 26th, inclusive.

COMPARATIVE TABLE OF DISCHARGE.

LOS PINOS RIVER AT IGNACIO, COLO.—Concluded.

Month	Stage of Water	1899 (a)	1000
November	Maximum	124	------------
	Mean	103	------------
	Minimum	89	------------
December	Maximum	89	------------
	Mean	59	------------
	Minimum	49	------------

(a) 1899, record begins April 23 and ends December 21.

DURANGO STATION ON FLORIDA RIVER.

This stream, which is a tributary of the Animas river, rises in the Needle mountains and flows in a generally southerly direction until it enters the Animas a short distance before the latter stream passes into New Mexico. The stream is not a large one at normal stages, and as there are great tracts of land lying adjacent to it that might be irrigated, provided there was a sufficient supply of water, plans have been made for storing the floods in large reservoirs, sites for which have been found upon the head waters of the stream. It was for the purpose of forming an idea as to how much water went to waste that this station was established on May 19, 1899. It was located at the wagon bridge on Stewart's ranch, nine miles east of Durango, the rod being fastened to the down stream side on the left hand, to the abutment of the bridge. The channel is favorable for accurate measurements, being quite stable, but owing to the length of time required to reach this point from Durango, readings were kept up for only a part of one year. The observer was Mrs. Stewart.

LIST OF DISCHARGE MEASUREMENTS

MADE ON FLORIDA RIVER AT DURANGO, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	May 19	A. L. Fellows	88	2.25	62	3.83	236
2	June 24	A. L. Fellows	88	.70	9	1	9

TABLE OF DISCHARGE

OF THE FLORIDA RIVER AT DURANGO, COLO.

Year	Stage of Water	MONTH		
		May (a)	June	July
1899	Maximum	189	121	212
	Mean	139	68	45
	Minimum	105	12	7

(a) Beginning May 21st.

DURANGO STATION ON ANIMAS RIVER.

The Animas river is the largest tributary of the San Juan in Colorado, and derives its water from the high mountains above Silverton, draining portions of the Needle and of the La Plata mountains, in addition to those at its source. The stream flows in a generally southerly direction about sixty miles, crossing the state line at a point about fifteen miles south of Durango. The river flows through a very mountainous country in its upper course, but in the vicinity of Hermosa it issues from the canon into a broad valley, which is extensively irrigated. A canal line has been projected from the lower part of the stream for the purpose of irrigating lands in New Mexico, but the canal has never been finished.

The station is located at a wagon bridge west of the depot on the Denver & Rio Grande railroad, the rod being at present fastened to the central pier. In the early part of 1899 the old wooden bridge was removed and a new bridge was erected a short distance below the site of the old one, and in April a gauge rod was attached to this new bridge. Owing to the change of location and height of the rod there is no apparent relation between the rating tables for the previous years and the rating tables for 1899 and 1900.

Lightner creek enters Animas river from the right about one hundred feet below the wagon bridge. The channel is straight both above and below the station, and the bed is of gravel and boulders and fairly permanent. The observer is C. G. Graden of Durango.

LIST OF DISCHARGE MEASUREMENTS

MADE ON THE ANIMAS RIVER AT DURANGO, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
23	April 21..	A. L. Fellows	88	7.50	256	2.73	698
24	May 19..	A. L. Fellows	88	9.45	569	4.63	2,635
25	June 24..	A. L. Fellows	88	8.10	331	3.80	1,256
26	Sept. 28..	A. L. Fellows	133	6.52	119	1.89	223
27	Nov. 25..	A. L. Fellows	133	6.50	134	1.50	201
	1900						
28	Mar. 26 .	A. L. Fellows	71	6.60	141	1.74	246
29	May 9..	A. L. Fellows	71	8.65	425	3.80	1,614
30	June 25..	A. L. Fellows	71	8.80	423	4.11	1,740
31	Aug. 13..	A. L. Fellows	138	6.45	125	1.37	169

COMPARATIVE TABLE OF DISCHARGE OF THE ANIMAS RIVER AT DURANGO, COLO.

Month	Stage of Water	1895	1896	1897	1898	1899	1900
January	Maximum	--------	--------	492	562	--------	236
	Mean	--------	--------	31 ~~212~~	399	--------	179
	Minimum	--------	--------	162	278	--------	143
February	Maximum	--------	--------	218	442	--------	143
	Mean	--------	--------	186	267	--------	133
	Minimum	--------	--------	138	195	--------	122
March	Maximum	--------	--------	492	383	--------	272
	Mean	--------	--------	258	306	--------	224
	Minimum	--------	--------	188	278	--------	122
April	Maximum	--------	3,776	4,786	2,910	1,256	516
	Mean	--------	1,634	2,704	1,510	584	335
	Minimum	--------	869	546	412	138	236
May	Maximum	--------	4.042	5,703	3,664	3,240	3,830
	Mean	--------	2,326	4 ~~4,553~~	1,765	1,730	2,183
	Minimum	--------	956	3,618	1,292	532	490
June	Maximum	836	1,902	5,110	4,678	2,855	3,466
	Mean	646	875	3,364	3,438	1,797	1,990
	Minimum	574	334	1,741	2,125	923	811
July	Maximum	574	508	1,741	3,220	1,208	811
	Mean	388	349	1,152	1,364	668	409
	Minimum	278	272	686	502	402	236
August	Maximum	990	292	812	502	2,049	236
	Mean	510	199	554	365	691	179
	Minimum	208	138	328	328	315	143
September	Maximum	512	7,800	1,366	442	379	394
	Mean	363	1,004	~~906~~	263	276	231
	Minimum	278	218	274	160	201	143
October	Maximum	379	826	2,272	178	357	310
	Mean	307	475	1,418	162	297	252
	Minimum	259	334	812	160	201	201

COMPARATIVE TABLE OF DISCHARGE.

OF THE ANIMAS RIVER AT DURANGO, COLO.—Concluded.

Month	Stage of Water	1895	1896	1897	1898	1899	1900
November	Maximum	296	334	748	214	315	236
	Mean	246	274	[illegible] ~~572~~	158	267	205
	Minimum	224	203	384	128	201	201
December	Maximum	316	252	442	--------	275	--------
	Mean	251	216	[illegible] ~~387~~	--------	212	--------
	Minimum	208	188	328	--------	168	--------

NOTE—1899, October record, 8 days; November, 9 days; December, 8 days.

1900, January record, 8 days; February, 4 days; March, 23 days; October, 16 days

Revised published in USGS 19th Ann Report Page 414.

MANCOS STATION ON MANCOS RIVER.

The Mancos river is the last important tributary of the San Juan in Colorado. It rises in the western slope of the La Plata mountains and flows in a southwesterly direction through a mountainous country for about twelve miles to the Mancos valley, which is a broad and fertile tract irrigated by the waters taken from the river, through which it flows for a distance of another twelve miles, when it enters the canon cut through the Mesa Verde, flowing through what is known as Mancos canon for about forty miles to its junction with the San Juan. The normal supply of this stream is exhausted, but sufficient water goes to waste in the flood season to irrigate all of the tillable land along its borders if it be properly stored. To determine the amount going to waste in seasons of high water, the station was established at the town of Mancos, April 9, 1898, the rod being fastened to a tree about one hundred feet below the wagon bridge crossing the river in the center of the town. The channel is of boulders and gravel, and until 1900 proved fairly stable, but during this year so many changes occurred in the bed of the stream that it has been found impossible to make a rating table this season.

The observer is Mrs. W. H. Kelley of Mancos.

LIST OF DISCHARGE MEASUREMENTS

MADE ON MANCOS RIVER AT MANCOS, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
5	April 19..	A. L. Fellows ...	88	1.65	22	3.23	70
6	May 18..	A. L. Fellows ...	88	1.60	21	2.63	56
7	June 23..	A. L. Fellows ..	88	1.10	5	1.66	9
8	Sept. 22..	A. L Fellows ...	133	.90	---------	----------	2
9	Nov. 24..	A. L. Fellows ...	133	1	2	1.15	3
	1900						
10	Mar. 23..	A. L. Fellows ..	71	1.05	3	1.39	4
11	May 7..	A. L. Fellows ...	71	1.80	24	3.42	82
12	June 26..	A. L. Fellows ...	71	1.70	10	1.60	16
13	Aug. 12..	A. L. Fellows ...	138	1.40	----------	----------	2

COMPARATIVE TABLE OF DISCHARGE

OF THE MANCOS RIVER AT MANCOS, COLO.

Year	Stage of Water	MONTH							
		April	May	June	July	August	September	October	November
1898	Maximum	375	270	249	333	12	12	--------	--------
	Mean	262	203	212	107	9	6	--------	--------
	Minimum	123	144	144	0	8	1	--------	--------
1899	Maximum	91	144	81	19	102	123	60	--------
	Mean	42	74	33	9	40	33	22	5
	Minimum	5	19	5	3	8	5	1	--------
1900	Maximum	2.05	2.95	2.90	1.60	1.70	2.10	2.00	--------
	Mean	1.42	2.64	2.10	1.31	1.43	1.75	1.69	--------
	Minimum	1	1.90	1.60	.70	1.10	1.40	1.60	--------

NOTE—The 1900 flow is indicated by comparison of gage height records.

SURFACE CREEK RESERVOIR, DELTA COUNTY,

GRAND RIVER IRRIGATION DIVISION.

Grand river irrigation division, or division No. 5, includes all lands in Colorado upon the Grand river and its tributaries. The river itself is the largest in the state and takes its rise in north central Colorado, in Middle park, the stream draining the mountainous country on the west side of the front range and the south side of the continental divide. The streams of the Grand river and its tributaries flow generally through mountainous country at the heads, thence through a canon and broken country throughout their entire course. Upon most of the streams little irrigation has been practiced, excepting along the valleys immediately contiguous to the streams. The Uncompahgre river, however, is an exception to this rule as practically all of the waters of this stream have been taken out and used in irrigating the table lands of the Uncompahgre valley.

The Dolores river also furnishes a notable exception in that the waters of this stream are taken through the divide between the Grand and San Juan divisions, and irrigate lands lying in the latter division. Owing'to the comparatively small amount of land that can be irrigated along the main streams, but a fraction of the water in this division has been used, but a number of projects have been devised for taking water in great canals onto the fertile benches lying along these various streams, and in one case, viz., on the Gunnison river, of taking water from that stream through the divide for the purpose of irrigating lands in the Uncompahgre valley.

But few stations have been kept up in these divisions owing to the lack of necessary funds, but enough information has been obtained to demonstrate the importance both of establishing more stations and of keeping up those already established.

GLENWOOD SPRINGS STATION ON GRAND RIVER.

This station was first located May 12, 1899, at the request of the Denver & Rio Grande Railroad Company, at the railroad bridge one-fourth of a mile west of the depot and just above the mouth of the Roaring Fork. A wire gauge was used, but at the beginning of 1900 a new gauge rod was located near the electric light works of the Colorado hotel. Measurements are made from the wagon bridge crossing the river between the town and the hotel. The channel is good, composed of gravel and of rock, and is not liable to great change. Gauge readings were taken only during the high water season in 1899, being discontinued June 17, but were resumed January 1, 1900, at the new station.

The observer is W. H. Richardson, superintendent of the electric light plant.

LIST OF DISCHARGE MEASUREMENTS

MADE ON GRAND RIVER AT GLENWOOD SPRINGS, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	May 12	A. L. Fellows	88	6.05	1,480	11.88	17,577
2	June 17	A. L. Fellows	88	10.22	2,157	13.53	29,187
3	Nov. 17	A. L. Fellows	133	2.75	541	2	1,084
	1900						
4	Mar. 19	A. L. Fellows	71	3.80	526	2.17	1,140
5	July 8	A. L. Fellows	71	5.40	884	4.26	3,764
6	Aug. 23	A. L. Fellows	71	3.60	514	2.11	1,086

TABLE OF GAGE HEIGHTS AND DISCHARGE.

GRAND RIVER AT GLENWOOD SPRINGS, COLO.

Year	Stage of Water	MONTH		
		May	June	July
1899	Maximum	8.15	10.65	7.10
	Mean	7.30	8.64	6.15
	Minimum	6.20	6.40	4.70

1899 record taken May 12 to July 17.

TABLE OF DISCHARGE.

GRAND RIVER AT GLENWOOD SPRINGS, COLO.

Year	Stage of Water	MONTH											
		January	February	March	April	May	June	July	August	Sept.	October	Nov.	Dec.
1900	Maximum	970	935	1,460	3,490	22,895	22,390	7,270	1,460	870	755	935	840
	Mean	890	883	1,187	1,818	11,963	14,817	3,121	1,134	800	755	865	681
	Minimum	810	810	902	1,120	3,245	7,622	1,515	935	755	755	728	570

GRAND JUNCTION STATION ON GRAND RIVER.

Opposite the town of Grand Junction the Grand river divides itself into two channels, through which the water flows sometimes through one and sometimes through the other, and at times of high water through both. On this account there are two gauge rods at this station, one for the right-hand channel and the other for the left. This station was established in 1895, and at that time most of the water flowed through the right channel. During the last four years a greater portion of the water has run through the left channel, and during the year 1900 there was a flow through the right channel for but a very short time. Gauge rod No. 1 is attached to the south end of the wagon bridge crossing the river south of town. Gauge rod No. 2 consists of a wire and weight fastened to the upper side of the bridge over the left channel. The channel is sandy and shifting, and the discharge must therefore be considered as approximate. No rating table was possible in 1900. Observations were made by B. W. Vedder in 1899, and W. H. Smith in 1900.

LIST OF DISCHARGE MEASUREMENTS

MADE ON GRAND RIVER AT GRAND JUNCTION, COLO.—ROD NO. 1.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
10	May 13..	A. L. Fellows	88	3.15	7.32	3.77	2,758
11	June 18..	A. L. Fellows	88	5.55	13.54	6.61	8,954

COMPARATIVE TABLE OF DISCHARGE

OF THE GRAND RIVER AT GRAND JUNCTION, COLO.—ROD NO. 1.

Month	Stage of Water	1897	1898	1899	1900 (d)
April	Maximum	3,399 (a)	--------	--------	--------
	Mean	704 (a)	--------	--------	--------
	Minimum	92 (a)	--------	--------	--------
May	Maximum	12,692	137 (c)	5,773	4.70
	Mean	9,974	84 (c)	3,551	4.35
	Minimum	3,880	15 (c)	70	3.80
June	Maximum	12,371	887	11,711	4.70
	Mean	5,353	286	6,596	3.45
	Minimum	805	--------	2,382	2
July	Maximum	972 (a)	--------	4,876	--------
	Mean	152 (a)	--------	1,953	--------
	Minimum	24 (a)	--------	33	--------

(a) From April 15th, 1897.
(b) To May 14th, 1897.
(c) Beginning May 26th.
(d) 1900 given in gage heights in feet.

LIST OF DISCHARGE MEASUREMENTS

MADE ON GRAND RIVER AT GRAND JUNCTION, COLO.—ROD NO. 2.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
16	April 15	A. L. Fellows	88	4.70	1,008	2.92	2,946
17	May 13	A. L. Fellows	88	10	2,058	9.91	20,395
18	June 18	A. L. Fellows	88	11.55	--------	--------	(a) 30,000
19	Sept. 19	A. L. Fellows	133	4.20	1,135	1.75	1,989
20	Nov. 18	A. L. Fellows	133	3.90	1,015	1.89	1,916
	1900						
21	Mar. 20	A. L. Fellows	71	4.15	966	1.82	1,762
22	July 7	A. L. Fellows	71	5.80	1,465	4.22	6,177

(a) Estimated.

COMPARATIVE TABLE OF DISCHARGE

OF THE GRAND RIVER AT GRAND JUNCTION, COLO.—ROD NO. 2.

Month	Stage of Water	1897	1898	1899	1900
January	Maximum	440	3,858	....	3.70
	Mean	318	2,888	....	3.65
	Minimum	214	2,500	....	3.60
February	Maximum	591	3,470	2,080	3.90
	Mean	419	3,792	2,057	3.80
	Minimum	334	2,113	1,990	3.60
March	Maximum	2,101	2,307	2,080	4.30
	Mean	861	2,113	1,800	4.12
	Minimum	334	1,919	1,650	3.90
April	Maximum	8,017	6,886	10,540	5.40
	Mean	2,906	4,039	3,940	4.54
	Minimum	893	1,725	1,650	4
May	Maximum	23,642	12,505	24,680	10.95
	Mean	18,371	7,114	16,855	8.42
	Minimum	8,770	4,633	5,010	5.50
June	Maximum	23,077	16,375	31,120	10.35
	Mean	18,841	13,417	24,710	8.71
	Minimum	14,229	8,279	16,970	6.90
July	Maximum	14,041	7,611	23,030	6.70
	Mean	8,464	4,445	13,124	4.72
	Minimum	3,460	1,725	6,860	3.45
August	Maximum	5,570	1,725	9,365	3.35
	Mean	3,076	1,127	4,577	2.78
	Minimum	1,799	949	2,300	2.40
September	Maximum	2,856	1,143	2,855	3.30
	Mean	1,902	907	2,164	2.73
	Minimum	1,648	561	1,920	2.40
October	Maximum	2,403	1,143	2,450	3.10
	Mean	1,913	915	2,055	2.97
	Minimum	1,497	561	1,860	2.90

COMPARATIVE TABLE OF DISCHARGE

OF THE GRAND RIVER AT GRAND JUNCTION, COLO.—ROD NO. 2—Concluded.

Month	Stage of Water	1897	1898	1899	1900
November	Maximum	1,950	1,337	--------	2.90
	Mean	1,683	1,072	1,920	2.74
	Minimum	1,270	755	--------	2.55
December	Maximum	1,648	2,500	--------	2.70
	Mean	1,497	1,001	1,800	2.55
	Minimum	1,346	367	--------	2.45

Note—1899, records given for February 22 to 25, March 11 days, October 4 days, November 4 days, December 1 day. 1900 is given in gage heights in feet.

IOLA STATION ON GUNNISON RIVER.

The Gunnison river, which is the largest tributary of the Grand, rises in southern central Colorado, in the Saguache mountains and Cochetopa hills, and flows in a westerly direction, emptying into the Grand river near the western boundary of the state, a short distance south of Grand Junction. Comparatively little of the water is used for irrigation, but a canal line has been surveyed with a view to taking the water from the Gunnison river and carrying it to the valley of the Uncompahgre river, as above mentioned. It was with the object of determining the amount of water available for such a project that the Iola station was located. The rod is placed at a wagon bridge which crosses the Gunnison river about one-fourth of a mile above the railroad station of the Denver & Rio Grande railroad at Iola, measurements having been made and records kept up during the year 1900. The gauge heights have been telegraphed each day to Denver and published by the United States weather bureau. The channel at this point is wide, and the bed, being of gravel and boulders, is not particularly liable to change.

The observer is A. Pomel, postmaster at Iola.

LIST OF DISCHARGE MEASUREMENTS

MADE ON GUNNISON RIVER AT IOLA, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1900						
1	May 3..	A. L. Fellows	71	3	464	2.74	1.272
2	June 28..	A. L. Fellows	71	3.40	505	3.28	1,658
3	July 5..	A. L. Fellows	71	2.90	449	2.60	1,169
4	Aug. 9..	A. L. Fellows	138	2.20	316	1.36	431
5	Aug. 25..	A. L. Fellows	71	2.10	300	1.31	392

TABLE OF DISCHARGE.

OF THE GUNNISON RIVER AT IOLA, COLO

Year	Stage of Water	MONTH						
		April	May	June	July	August	September	October
1900	Maximum	1,258	4,388	4,265	1,359	450	350	250
	Mean	773	2,875	2,726	727	360	260	250
	Minimum	551	1,157	1,460	350	350	250	250

GRAND JUNCTION STATION ON GUNNISON RIVER.

This station was located at the wagon bridge about two miles south of Grand Junction, having been established in May, 1897, since which time records have been kept up during a portion of each year until the fall of 1899, when the station was abandoned, as it was found that at very high stages the water of the Grand river backed up to the rod on the Gunnison river, thus affecting the relations between the discharge and gauge height. The channel is, moreover, unsatisfactory, owing to the fact that the bed is shifting and liable to change, and that there is a very deep hole, partially filled with boulders, at the wagon bridge. A better location for a station would be at Whitewater, eleven miles above.

The observer in 1899 was A. Lindquist, of Grand Junction.

LIST OF DISCHARGE MEASUREMENTS

MADE ON THE GUNNISON RIVER AT GRAND JUNCTION, COLO.

Nnmber of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
16	April 15..	A. L. Fellows	88	3.50	1,261	2.38	3,002
17	May 13..	A. L. Fellows	88	7	1,941	7.36	14.280
18	June 18..	A. L. Fellows....	88	7.15	1,811	7.05	12,769
19	Sept. 19..	A. L. Fellows	133	2.20	941	1.13	1,061
20	Nov. 18..	A. L. Fellows	133	2	884	1.09	968
	1900						
21	Mar. 20..	A. L. Fellows	71	2.50	1,011	1.46	1.477
22	July 7..	A, L. Fellows	71	2.90	1.187	1.79	2.121

COMPARATIVE TABLE OF DISCHARGE
OF THE GUNNISON RIVER AT GRAND JUNCTION, COLO.

Month	Stage of Water	1897	1898	1899	1900
	Maximum	--------	--------	8,792	--------
April	Mean	--------	--------	3,550	--------
	Minimum	--------	--------	968	--------
	Maximum	19,834	8,996	16,750	--------
May	Mean	16,282	5,318	10,296	--------
	Minimum	12,816	3,965	3,902	--------
	Maximum	18,558	11,361	16,750	--------
June	Mean	12,263	8,850	12,380	--------
	Minimum	7,393	4,158	8,078	--------
	Maximum	7,393	3,965	8 430	--------
July	Mean	4,410	2,543	4,342	--------
	Minimum	1,676	1,076	2,246	--------
	Maximum	2,289	968	4,562	--------
August	Mean	991	689	1,921	--------
	Minimum	172	578	908	--------
	Maximum	1,676	578	1,000	--------
September	Mean	482	479	875	--------
	Minimum	172	399	758	--------
	Maximum	2,608	672	--------	--------
October	Mean	1,598	533	--------	--------
	Minimum	828	399	--------	--------
	Maximum	1,092	672	--------	--------
November	Mean	742	496	--------	--------
	Minimum	212	311	--------	--------
	Maximum	650	--------	--------	--------
December	Mean	458	--------	--------	--------
	Minimum	262	--------	--------	--------

FORT CRAWFORD STATION ON THE UNCOMPAHGRE RIVER.

The Uncompahgre river has its source in Ouray county, in the high peaks of southwestern Colorado, and flows in a generally northwesterly direction, entering the Gunnison river at Delta. The upper portion of its drainage basin is mountainous, but proceeding down stream the country becomes more rolling and irrigation is possible along the valleys and adjacent mesas. In the vicinity of Montrose a number of canals divert nearly all of the normal flow and recourse must be had to storage or a diversion of the waters in the Gunnison for further irrigation in this district.

The Fort Crawford station is located at a wagon bridge about one-half of a mile east of the depot at Fort Crawford, being about eight miles above Montrose. It was established June 25, 1895, and records were kept up throughout the seasons of 1895 to 1899, inclusive, in the fall of which latter year the station was abandoned owing to the great changes in the channel at this point. The river bed consists of gravel and boulders and shifts badly.

LIST OF DISCHARGE MEASUREMENTS

MADE ON UNCOMPAHGRE RIVER AT FORT CRAWFORD, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
23	April 16..	A. L. Fellows....	88	4.50	88	3.73	328
24	May 15..	A. L. Fellows....	88	5.22	126	5.93	747
25	June 19..	A. L. Fellows....	88	5.18	143	5.40	773
26	Sept. 21..	A. L. Fellows....	133	3.65	27	2.54	69
27	Nov. 20..	A. L. Fellows....	133	3.70	29	2.72	79

COMPARATIVE TABLE OF DISCHARGE

OF THE UNCOMPAHGRE RIVER AT FORT CRAWFORD, COLO.

Month	Stage of Water	1895	1896	1897	1898	1899
April	Maximum	--------	--------	757	478	481
	Mean	--------	--------	386	327	263
	Minimum	--------	--------	141	55	102
May	Maximum	--------	3,375	1,082	521	915
	Mean	--------	1,010	787	306	534
	Minimum	--------	207	568	195	240
June	Maximum	1,535	1,920	1,467	985	1,163
	Mean	1,082	519	994	704	709
	Minimum	835	190	514	436	259
July	Maximum	835	207	1,412	892	450
	Mean	470	126	527	430	252
	Minimum	200	62	151	37	150
August	Maximum	740	115	274	274	512
	Mean	277	38	136	111	138
	Minimum	167	10	55	15	19
September	Maximum	167	426	274	110	137
	Mean	117	148	146	67	41
	Minimum	72	62	55	37	4
October	Maximum	99	174	360	92	---------
	Mean	70	106	204	58	---------
	Minimum	55	62	138	46	---------
November	Maximum	99	115	179	110	---------
	Mean	82	86	127	54	---------
	Minimum	55	62	95	28	---------
December	Maximum	274	--------	--------	--------	---------
	Mean	112	--------	--------	--------	---------
	Minimum	64	--------	--------	--------	---------

MONTROSE STATION ON UNCOMPAHGRE RIVER.

This station was established in the fall of 1899, no records being kept, however, until the spring of 1900. There is but little water at this point during the greater portion of the year as the canals above divert the most of the flow. The station is located at a bridge crossing the river opposite the town of Montrose, about one-half mile from the depot of the D. & R. G. railroad. The rod consists of a 1x4 board nailed to the pier just above the bridge. The channel is favorable to accuracy, being of gravel and boulders, and not liable to change. Records were kept for but a short time, as there was but little water during the greater part of the irrigation season of 1900.

Records were kept by W. E. Obert, commissioner of the Montrose water district.

LIST OF DISCHARGE MEASUREMENTS
MADE ON UNCOMPAHGRE RIVER AT MONTROSE, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
1	Sept. 20..	A. L. Fellows......	133	.40	15	1	15
2	Nov. 20..	A. L. Fellows	133	.45	14	1.08	15
	1900						
3	July 5..	A. L. Fellows	71	1.80	46	3.26	150
4	Aug. 10..	A. L. Fellows	138	.50	1	2	2

TABLE OF DISCHARGE
OF THE UNCOMPAHGRE RIVER AT MONTROSE, COLO.

Year	Stage of Water	MONTH				
		April	May	June	July	August
1900..........	Maximum.......	71	369	369	158	....
	Mean............	50 (a)	177	260	127 (b)	....
	Minimum........	18	51	122	68	2 (c)

(a) April record begins on 8th. (b) July record, 1st to 7th. (c) On August 10th.

DOLORES STATION ON DOLORES RIVER.

This river is the last important tributary of the Grand river. It has its source in the La Plata and San Miguel mountains, in which the highest peak, Mount Wilson, reaches an elevation of over 14,000 feet. Its course is generally northwesterly to its junction with the Grand river, which is across the Utah line. The river flows generally through a narrow canon and comparatively little irrigation is practiced along the stream itself, excepting at Dolores, where for some forty miles the valley widens out to a width of, perhaps, a mile, and a number of farms are cultivated. By far the greater part of the water of the Dolores river, however, is used in the San Juan watershed, being diverted by means of a tunnel and a great cut into the Montezuma valley. The canals carrying this water from the river head about two miles west of the present town of Dolores. The gauging station is located above these large canals and about one-half mile above the railroad station at Dolores. The gauge rod consists of a vertical plank attached to the left abutment of the foot bridge crossing the river from which the gaugings are made. The channel at this point is not liable to change and the results obtained are excellent. The bed of the stream is composed of small stones and gravel. A number of measurements were made at Rico, the measurements being given in a separate table.

The observer is Mrs. M. D. Smith, of Dolores.

LIST OF DISCHARGE MEASUREMENTS

MADE ON THE DOLORES RIVER AT DOLORES, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
27	April 20..	A. L. Fellows	88	3.60	58	3.88	613
28	May 17..	A. L. Fellows	88	4.15	194	4.96	963
29	June 27..	A. L. Fellows	88	3.30	108	2.85	307
30	Nov. 22..	A. L. Fellows	133	2.70	28	2.03	56
	1900						
31	Mar. 24..	A. L. Fellows	71	2.90	60	2.41	145
32	May 5..	A. L. Fellows	71	3.90	174	4.41	767
33	June 27..	A. L. Fellows	71	3.25	130	2.46	320
34	Aug. 11..	A. L. Fellows	138	2.60	34	.91	31

COMPARATIVE TABLE OF DISCHARGE
OF THE DOLORES RIVER AT DOLORES, COLO.

Month	Stage of Water	1895	1896	1897	1898	1899	1900
January	Maximum	--------	--------	--------	--------	--------	220
	Mean	--------	--------	--------	--------	--------	195
	Minimum	--------	--------	--------	--------	--------	164
February	Maximum	--------	--------	--------	--------	--------	164
	Mean	--------	--------	--------	--------	--------	107
	Minimum	--------	--------	--------	--------	--------	82
March	Maximum	--------	557	--------	--------	82	192
	Mean	--------	244	--------	--------	(a) 37	101
	Minimum	--------	96	--------	--------	20	37
April	Maximum	--------	1,578	2,944	1,978	885	555
	Mean	--------	747	1,483	1,093	437	284
	Minimum	--------	144	235	198	37	100
May	Maximum	--------	1,452	2,838	1,875	1,461	1,731
	Mean	--------	952	2,435	1,207	785	1,318
	Minimum	--------	373	1,991	912	118	483
June	Maximum	848	781	2,521	2,030	810	1,596
	Mean	702	263	1,465	1,510	499	808
	Minimnm	605	44	568	784	220	280
July	Maximum	490	480	608	1,229	412	220
	Mean	270	130	368	491	207	84
	Minimum	127	44	186	144	100	37
August	Maximum	548	180	235	229	736	37
	Mean	248	38	148	121	204	29
	Minimum	97	8	76	102	30	20
September	Maximum	177	1,176	852	293	82	250
	Mean	96	195	394	78	33	90
	Minimum	68	28	76	34	23	23
October	Maximum	97	180	568	50	343	118
	Mean	79	113	390	37	93	83
	Minimum	68	96	235	34	23	56

(a) 1889, record begins March 22d.

COMPARATIVE TABLE OF DISCHARGE

OF THE DOLORES RIVER AT DOLORES, COLO.—Concluded.

Month	Stage of Water	1895	1896	1897	1898	1899	1900
November	Maximum	405	618	260	72	82	220
	Mean	134	179	172	48	49	88
	Minimum	42	36	108	34	37	37
December	Maximum	605	--------	--------	--------	220	377
	Mean	412	--------	--------	--------	151	216
	Minimum	281	--------	--------	--------	30	100

FALLCREEK STATION ON SAN MIGUEL RIVER.

This river has its source in the high mountain peaks in the southwestern corner of San Miguel county and drains the country immediately to the westward of the headwaters of the Uncompahgre. The general direction of the stream is northwesterly, entering the Dolores river in the western part of Montrose county. The station is located about three hundred yards southwest of Fallcreek a station on the Rio Grande Southern railroad. It was established in June, 1895, and records were kept at this point during each irrigation season until the fall of 1899, when the station was abandoned, it being believed that sufficient data had been obtained at this point to give a fairly accurate idea of the normal flow of the stream. The bed is of gravel and boulders and is not liable to change. The observer is Mrs. H. H. Hart.

LIST OF DISCHARGE MEASUREMENTS

MADE ON SAN MIGUEL RIVER AT FALL CREEK, COLO.

Number of Gaging	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
	1899						
22	April 18..	A. L. Fellows......	88	2.85	48	3.45	164
23	May 16..	A. L. Fellows......	88	3.70	96	5.87	562
24	June 21..	A. L. Fellows......	88	3.60	84	5.34	449
25	Nov. 21..	A. L. Fellows......	133	2.35	30	1.74	52

COMPARATIVE TABLE OF DISCHARGE
OF THE SAN MIGUEL RIVER AT FALL CREEK, COLO.

Month	Stage of Water	1895	1896	1897	1898	1899
April	Maximum	....	531	433	448	299
	Mean	....	281	213	273	134
	Minimum	....	147	52	196	25
May	Maximum	....	2.404	962	545	934
	Mean	....	770	627	296	416
	Minimum	....	310	369	196	126
June	Maximum	587	684	907	1,515	1,000
	Mean	556	319	774	813	528
	Minimum	512	135	504	571	249
July	Maximum	550	350	621	760	387
	Mean	311	157	375	380	238
	Minimum	219	93	243	109	176
August	Maximum	312	113	288	183	387
	Mean	227	65	183	133	195
	Minimum	145	49	122	109	105
September	Maximum	168	1 069	304	121	138
	Mean	100	176	215	89	101
	Minimum	60	62	132	66	64
October	Maximum	191	135	273	66	....
	Mean	64	82	184	50	....
	Minimum	42	49	122	30	....
November	Maximum	180	147	132	66	....
	Mean	45	57	96	40	....
	Minimum	6	22	62	22	....
December	Maximum	13	....	....	....	....
	Mean	7	....	....	....	....
	Minimum	6	....	....	....	....

GREEN RIVER IRRIGATION DIVISION.

This irrigation division consists of lands that are drained by the Green river and its tributaries in Colorado. The Green river itself does hardly more than just touch the state as it cuts through a canon in its nothwestern corner for a distance of about twenty miles. A number of important streams flow through the state into the Green, however, the principal of these being the Yampa river into which flows Williams Fork, and the Little Snake, and the White. The nature of the country in that quarter of the state is similar to portions of that along the Grand and San Juan rivers, the valleys being comparatively narrow and but little of the total discharge of the streams being used for irrigation at the present time. A number of irrigation projects have been considered, however, and it is likely that a great part of the waters of this stream will be eventually used. No gauging stations have been maintained in this division owing to the length of time required to reach this portion of the state from the railroad and the lack of funds to meet the expenses. A short trip was taken through this section, however, beginning with the 1st of November, 1900, and ending with the 8th of the same month, the results of which are given below.

LIST OF DISCHARGE MEASUREMENTS

ON VARIOUS STREAMS IN GREEN RIVER DIVISION.

River	Station	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
		1900						
Ashley (in Utah)	At mouth	Oct. 30	A. L. Fellows	353		54	2.05	11
Snake	Lily park, Colo	Nov. 1	A. L. Fellows	353		45	1.45	65
Yampa	Lily park, above Snake river	Nov. 1	A. L. Fellows	353		235	1.58	371
Yampa	Thornburgh bridge	Nov. 2	A. L. Fellows	353		109	2.96	322
Yampa	Craig	Nov. 5	A. L. Fellows	353		159	1.77	282
Williams	Hamilton	Nov. 6	A. L. Fellows	353		34	1.03	35
Axial	Three miles below Axial postoffice	Nov. 6	A. L. Fellows	353		4	1.25	5
White	Meeker	Nov. 7	A. L. Fellows	353		112	3.51	394
Piceance	At mouth	Nov. 7	A. L. Fellows	353		7	1.85	13
White	Rangeley bridge	Nov. 8	A. L. Fellows	353		112	3.69	413

MISCELLANEOUS GAUGINGS.

In addition to the gaugings given in previous tables, a number have been made at various points scattered throughout the state. These gaugings range throughout all the various divisions, but are grouped together so as not to increase the number of tables.

In this connection we wish to urge that all engineers who make gaugings throughout the state will, whenever it is in their power, send the results to this office for permanent record. It is evident that while there may be a vast amount of information scattered about amongst the different engineering offices of the state, they can be of but little public value unless they are compiled and made matters of public record. If, however, this could be done, as is being done by a few of the engineers, much valuable information might be preserved and made of general utility. This matter has been urged in the past but without very much response. Engineers may be assured that due credit will in all cases be given.

LIST OF MISCELLANEOUS DISCHARGE MEASUREMENTS.

River	Station	Date	Hydrographer	Meter Number	Gage Height (feet)	Area of Section (square feet)	Mean Velocity (feet per second)	Discharge (in cubic feet per second)
		1899						
Dolores	Rico	April 19	A. L. Fellows	88	none	36	4.72	168
Fall creek	Fall creek	May 16	A. L. Fellows	88	none	12	5.18	62
Roaring Fork	Glenwood Springs	June 17	A. L. Fellows	88	none	1,040	10.83	11,258
Fall creek	Fall creek	June 21	A. L. Fellows	88	none	9	5	45
Rio Grande	Six miles below Alamosa	Aug. 20	A. L. Fellows	88	none	18	.95	17
Rio Grande	Half mile above Alamosa	Aug. 23	A. L. Fellows	88	none	5	1.80	10
Dolores	Rico	Sept. 22	A. L. Fellows	133	none	13	1.69	23
Roaring Fork	Glenwood Springs	Nov. 17	A. L. Fellows	133	none	182	2.51	457
Dolores	Rico	Nov. 22	A. L. Fellows	133	none	10	1.62	16
		1900						
San Antonio	Antonito	May 11	A. L. Fellows	71	none	181	2.61	473
San Antonio	Antonito	June 22	A. L. Fellows	71	none	5	.75	4
Roaring Fork	Glenwood Springs	July 8	A. L. Fellows	71	none	332	4.73	1,570
Roaring Fork	Glenwood Springs	Aug. 23	A. L. Fellows	71	none	142	2.98	423

RECOMMENDATIONS.

A careful study of the tables given above will demonstrate the importance of these measurements. There are, however, a great number of stations in the different sections of the state upon which no figures showing discharges have as yet been obtained. The officers of the division of hydrography, of which Mr. F. H. Newell, of Washington, D. C., is chief, are anxious to continue this work and to extend it so far as possible. It will, however, be necessary for us to abandon a great number of the stations already maintained in order to acquire needed information concerning discharge of other streams not yet measured. Many of these stations which must be abandoned are, however, of very great importance to the water commissioners of the various districts in which they are located, for the purpose of determining the division to be made of the waters under their charge. It is unfortunate that the state engineer's office is not sufficiently supplied with funds to admit of its carrying on this work in co-operation with the geological survey. It is evident to those who have studied these matters that if the state of Colorado would furnish an amount equal to that furnished by the division of hydrography, and if the work were done in co-operation, as is done in some other states, the results obtained would be of far greater value to Colorado than they now are. It would then be possible to make detailed surveys of reservoir sites, examination of return waters from seepage, and other problems which it is impracticable for us to do more than touch upon at the present time.

I would respectfully urge upon your attention, moreover, to the importance already alluded to, of the state establishing permanent gauging stations. If such stations were constructed, for example, at the mouth of the canon of the Big Thompson, or at Lyons, on the St. Vrain, or more important still, in Platte canon or at Pueblo, the results obtained would far more than compensate for the outlay in the increased efficiency of the distribution of water. It would not, in that case, be necessary to make measurements every year, as a rating table, once computed, would be sufficient so long as the stations remained intact.

An illustration of the value of such stations is seen from an examination of the conditions at Fort Collins, where a permanent station was constructed some years ago by the state. This station, while not in the best repair at the present time, has answered its purpose admirably, as the water commissioner has for a number of years used the discharge of the stream, as shown by the gauge heights at this station, as a basis for dividing the water among the various ditches below in accordance with priority. If, as in the case there, such new stations were connected by telephone with the canal headgates along the river, the efficiency of the water commissioner would be multiplied several times over at a very much decreased expense.

I would respectfully suggest that there be urged upon the legislature the desirability of constructing at least one such gauge station each year.

Respectfully submitted,

A. L. FELLOWS,
Resident Hydrographer, U. S. Geological Survey.

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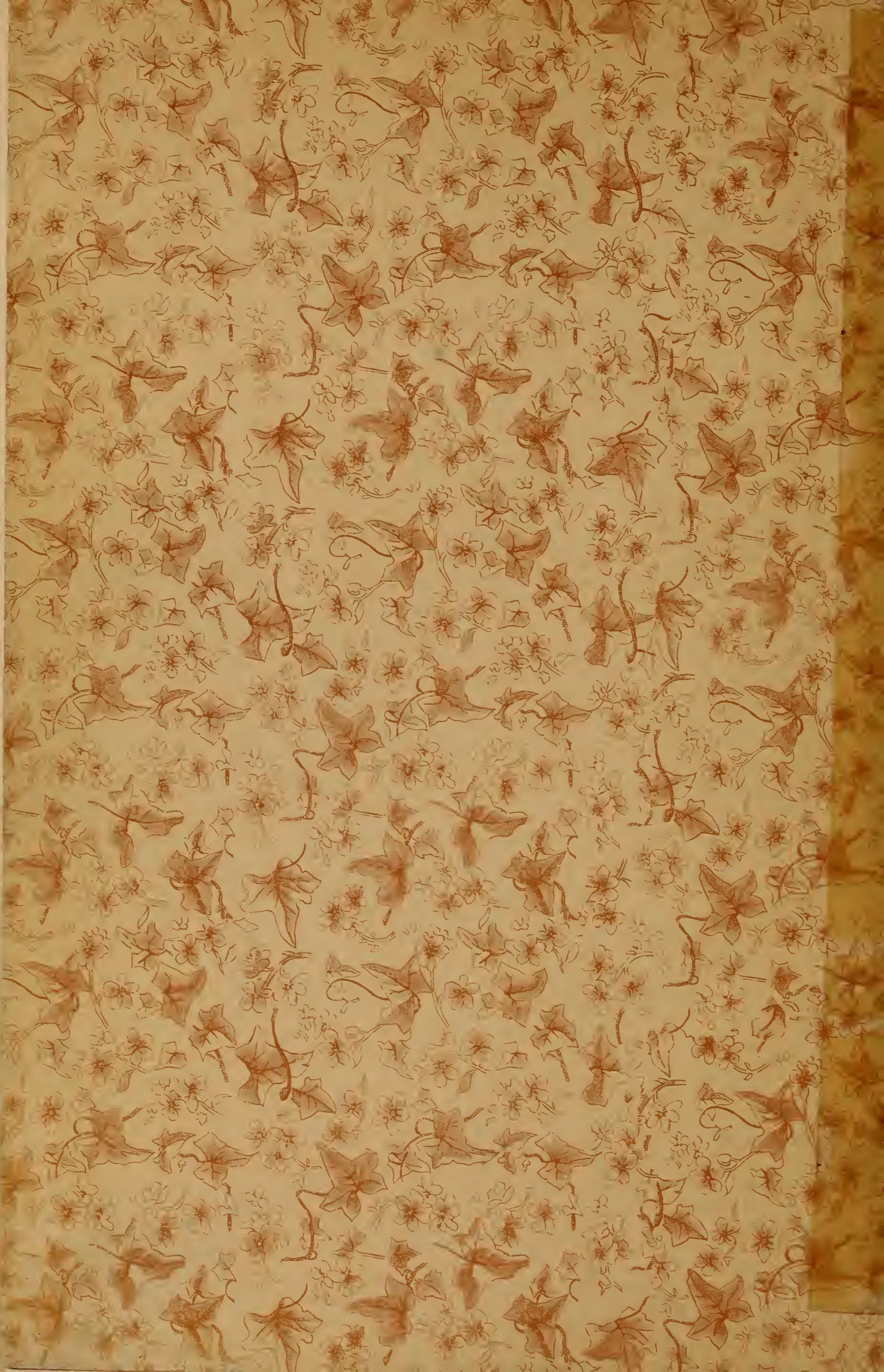

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